

3D WORLD

DAZZLING TV EFFECTS

BEHIND THE SCENES: The studios that are transforming CG on the small screen

CREATE THIS COVER SCENE

GROW YOUR 3D SKILLS

Discover how to make brilliant scenery with our tutorial, artist's tips and full software!

Landscape artist
Mix materials to create
a tropical paradise
See page 76

**24
PAGES OF
TRAINING**

Learn new techniques for
Maya, ZBrush, 3ds Max,
LightWave and more...

PLUS

The making of Tangled ●
Twilight: Eclipse VFX secrets ●
12-core Mac Pro on test ●
The best new 3D art ●

FLASH GOES 3D

The beta version is imminent...
but is it too little, too late?

MODELLING MASTER

Find out how one artist created
a stunning gladiator figure

SUCCESS STORY
How to get a job at
DreamWorks Animation

BUILD A BIOMECH
Work with organic and
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AMD
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3D WORLD

presents

Dax Pandhi

For Dax Pandhi, 3D is less a job than a vocation. He travels the world to research locations and environments, bringing what he learns to his stunning landscapes and outdoor scenes. This issue's tropical cover image, for example, was inspired by a recent visit to Costa Rica.

Dax's tool of choice is Vue, making him the ideal choice to lead this issue's coverage of this powerful scenery toolkit, in celebration of your complete copy of Vue 8 Frontier on the disc.

Created in Vue 9 Infinite (with an assist from World Machine for the mountains), the scene on this page shows what Vue is capable of. "Almost everything in this scene was done procedurally," says Dax. "The terrains were fractal-generated and all materials except leaf textures are designed in Vue from the ground up.



Everything in the scene is lit by a single light source – sunlight."

While Vue made the scene creation straightforward, Dax says rendering the nine-million-polygon scene proved more of a challenge. "The actual scene creation took less than six hours. Rendering for print took over 20 hours."

daxpandhi.com

LightWave™ 10

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Five things you'll find in every issue of 3D World

Expert analysis and opinion

1

Get under the skin of the 3D industry with regular assessments of industry trends. Pre-Viz looks at what's happening right now, while Post-Production and our in-depth features offer privileged access to the biggest names in the industry as they share their expertise with you.

Road-tested tutorials

2

Seasoned professionals from across the 3D industry write tutorials based on projects created especially for you. We test every step ourselves to ensure accuracy and accessibility.



Inspiring artwork

3

We comb all areas of the 3D scene to find the best examples of work that's being produced today, from the hottest commercials to game cinematics and illustrations. 3D World reflects the state of the art every month.



The whole of the 3D scene

4

Why restrict yourself? Whatever your main creative discipline, 3D World enables you to keep up with trends and techniques across animation, visual effects, games illustration and architecture. As the world of 3D evolves, so does 3D World.



Free disc

5

Your free disc contains 3D resources with an average commercial value of \$830.

Every month you'll receive a disc crammed with the best 3D assets we can lay our hands on, including the scene files you need to complete our training projects.

Welcome to 3D WORLD

"A hymn to all the coders: without them, we artists are nothing"



At the time of writing, we're just putting the finishing touches to the issue (my 17th, unbelievably!) and bidding a fond farewell to 2010. And what a year it's been for 3D World: we celebrated our tenth anniversary, hosted a global stereo-3D competition with Sony, created the biggest issue in our ten-year lifespan, and built a brand-new website. Not a bad year, all things considered.

But 2011 is just around the corner, and we have big plans ahead. Hopefully by next issue, we'll be back up to full strength with a new staff writer and technical editor, and ready to make further improvements to the mag. Now we have the website to deliver news and opinion, we want to focus our attention on delivering the very best CG training we can. We'll be doing more, better tutorials, focussing on the biggest apps – and if there's anything you really want to see in particular, please drop me a line at the email below.

The year ahead

But enough of 3D World; what about the world of 3D? I think 2010 has been one of the most exciting years for CG development in long time. High-end developments continue to tumble down to the desktop, becoming available to small studios or single artists. From technologies such as Ptex and 3D paint apps like Mari to motion-capture setups and simulations, increasingly you're limited in what you can create only by your budget and the available time.

Another common trend is interoperability: lots of developers are making sure their apps play nicely with others, often supporting specific file formats or even having data interchange systems built in. No app is an island any more, a trend I expect to continue into 2011.

The upshot of all this is that next year promises to be even more exciting, with programs that enable you to do more, in less time and at higher quality. So to celebrate the New Year, I'd like to toast the development community – programming teams and bedroom coders alike – who tirelessly strive to deliver the kind of technologies that, to paraphrase Arthur C Clarke, people like me find indistinguishable from magic. Keep the magic coming, guys.

Steve Jarratt, editor

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Introducing our advisory board

Each issue, our panel of leading figures from across the CG industry give us their advice and help

Spotlight on...



Jordi Barés

JOINT HEAD OF 3D, THE MILL

Jordi Barés worked in the games and film industries in his native Spain for eight years before moving to London in 2000, where he freelanced at Jim Henson's Creature Shop and Passion Pictures. The winner of numerous awards, he was nominated for an Emmy in 2004 for his work on the BBC documentary Pyramid. Since 2003, he has been joint head of 3D and VFX supervisor at Oscar-winning London VFX studio The Mill. His latest airing project is a series of 13 half-minute ads for Orangina which took him and his team six months to complete, including modelling and look development for redesigning existing characters. On page 34 of this issue, The Mill provides an insight into working on effects for TV.

Read the full biographies at 3dworldmag.com/board

This issue's contributors



Scott Spencer

DESIGNER AND DIGITAL SCULPTOR, WETA WORKSHOP

Scott is currently working on various film projects including Peter Jackson's The Hobbit. As the author of two books on ZBrush, he's the ideal person for our guide to creating a bio-mech with the app on page 68.



Dax Pandhi

3D ARTIST

Dax is a leading artist and trainer of dramatic natural environments using Vue, through his training website QuadSpinner. Check out his extensive Vue tutorial on page 76, plus his tips on getting the most of out the entry-level version Frontier on page 82.



Eran Dinur

COMPOSITING SUPERVISOR, BRAINSTORM DIGITAL

Previously senior compositor at Framestore NY and ILM Singapore, Eran also teaches Vue for fxphd and has worked on several major feature films. He takes a look at the latest version 9 of Vue on page 94.



Michael McCarthy

3D ARTIST AND TRAINER

An Autodesk Certified Instructor working in broadcast, feature film, and games, Michael continues our series on the fundamentals of lighting on page 74, with a look at interior lighting and how to achieve realistic results without global illumination.



Cirstyn Bech-Yagher

3D ARTIST

Cirstyn Bech-Yagher is a long-time 3D freelancer, currently working on BioWare game mods and a previz project. This issue she reviews two very different new vegetation generators: Onyx Garden Suite on page 101 and SpeedTree Cinema on page 102.

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Gustavo Capote
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Double Negative

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Founder,
Alex Morris Visualisation

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Ninja Theory

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of Curves

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Animator, Pixar

Ximo Peris
Creative director,
Crystal CG

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Joint head of 3D,
The Mill

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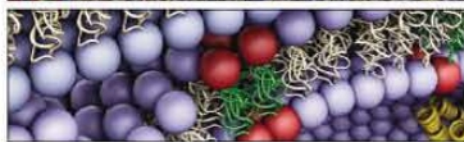
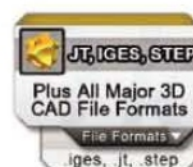
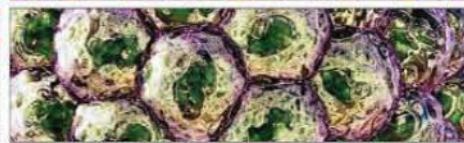
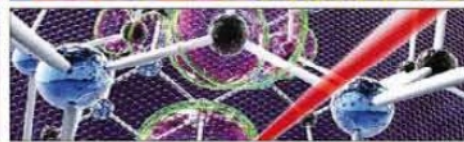
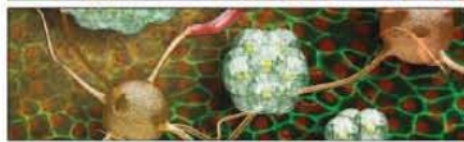
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Peter Allen of the UCSB College of Engineering has been using Okino's PolyTrans-for-Maya CAD+DCC conversion software for over a decade to produce stunning visualizations of engineering and bio-molecular data. See and read more about 50 of his visualization projects at <http://www.okino.com>. © 2010 Peter Allen & UCSB.

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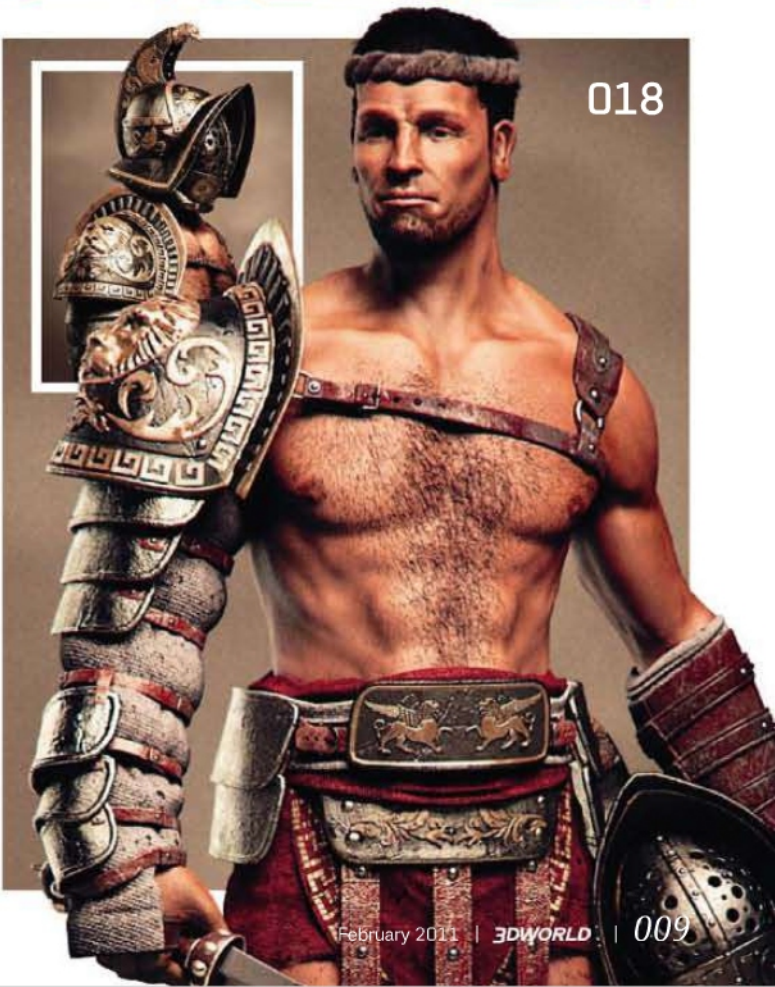
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This issue's disc is entirely dedicated to Vue 8 Frontier, so find out how to get the best from this complete package and start creating your own 3D worlds

Turn to page 112 to find out more about the contents of your packed free disc






Community

Images and opinion
from you, the
3D World readers

Portfolio

This month's selection of new 3D artwork
features a cathedral study, a futuristic city,
and Alice in Wonderland taking it easy

A detailed digital artwork of a futuristic aquatic city. In the foreground, a dense cluster of dark, metallic, rectangular buildings rises from the water. In the middle ground, a large, flat, rectangular platform floats on the water, also covered with similar buildings. In the background, a city skyline is visible on a distant landmass. The sky is filled with two large, dark, metallic blimps or airships. One is in the upper right, and the other is in the center. A small, sleek spaceship is visible in the distance, flying towards the left. The overall scene is set against a bright, hazy sky with soft clouds.

Artist Shuisong

Title City

Software 3ds Max, V-Ray, Photoshop

"I wanted to depict a futuristic aquatic city. To me, the building in the middle and the spaceship make it look as if this belongs to the future. That skyscraper in the middle was actually my favourite part of the image to create... the whole thing took ten days in all, and I used the Greeble plug-in for 3ds Max to help with the texturing. I'm a uni student, and although I haven't done a big project yet, I do enjoy CG art."

445823924@qq.com

blog.sina.com.cn/shuisong00

“To me, the building in the middle of the picture and the spaceship make it look as if this belongs to the future”



▲ Artist Artur Szygulski

Title Splash

Software Blender, Photoshop

"This probably took me about a month overall, working at night when my kids were asleep. I don't have a large amount of experience with 3D as really it's my hobby – this is my first 'big' render. I used to use 3ds Max, but now it's solely Blender, usually with YafaRay to render, although this image used the built-in renderer. I didn't really use any special techniques or shortcuts... sometimes I prefer to take longer and do everything by hand. That gives you full control over everything, but I know it's only really possible on small projects."

arturszygulski@op.pl

szygulski.blogspot.com





■ **Artist** Iain Banks

Title The Brain

Software 3ds Max, mental ray, Photoshop

"I'm a freelance architectural illustrator; I have a bachelor's degree in computer animation and worked for a year at a small computer games company called Coyote Developments. I also spent four years working for Hayes Davidson. This image took me about a week in total... the most time-consuming and technical part of the image would have been the modelling and texturing of the books. The Barcelona chairs, the piano and the shelving units I sourced from model websites."

iain@iainbanks.com

iainbanks.com

■ Artist Brunet Nicolas

Title Why Does a Raven Look Like a Writing Desk?

Software 3ds Max, ZBrush, After Effects, mental ray, Photoshop

"I originally created this picture for a contest run by 3DVF.com. It features Alice, the Mad Hatter and the Cheshire Cat, while the floating heads in the water were inspired by Tim Burton's film. The Mad Hatter's clothes were created using cloth simulation in 3ds Max, then the folds were accentuated in ZBrush. The Cheshire Cat's fur was the most time-consuming part to create. I've spent a long time doing hair and fur tests, so I applied my knowledge here and tackled each model by parts. There was no simulation here, all the hair and fur was created by hand."

dilandaudark@hotmail.com

1k0.blogspot.com





“ I did a lot of tests for the muddy water... I filled my bathtub with water and soil, then I dipped a teapot and other objects into it ”



■ Artist Serkan Çelik

Title Cockpit

Software 3ds Max, Maxwell Render, Photoshop

"I'm a landscape architect - I work at ElipsYapi, one of the biggest architecture and facade cladding companies in Turkey. This image took me about two months to create in total, mainly because of all the modelling. I didn't use any special techniques, just poly modelling in 3ds Max, which I've used for around five years. In fact the polygon count was becoming too high, so I had to use the Display as Box option to carry on with it. All the modelling and texturing here was done by me."

xsekox@gmail.com

cizgisahne.com

3D Image of the month

David Lesperance wins a copy of Poser Pro 2010, worth \$499. Linking pro production tools and ready-to-use 3D assets, Poser Pro saves development time and resources.

smithmicro.com

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■ **Artist** David Lesperance

Title Cathedral Study

Software 3ds Max, V-Ray, ZBrush, Photoshop

"I'm a cinematic environment artist for a California-based company, but I try to create at least one personal piece a month. This one took about 30 hours in all. I used ZBrush to create the base silhouettes of the profiles and refined them in Max – the V-Ray render was pretty straightforward, although dealing with the polys wasn't. Before I projected the image there were around 40-60 million polys, so I used V-Ray's proxy system to import the high-res geometry into a master render scene."

metelman123456123@yahoo.com

davidlesperance.blogspot.com



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portfolio@3dworldmag.com

Portfolio: In focus

Find out how Blur Studios' Eric Durante modelled and rendered his Gladiator as a side-project labour of love



■ **Artist** Eric Durante

Title Gladiator

Software 3ds Max, V-Ray, ZBrush, Photoshop, Magic Bullet LooksBuilder

"I work at Blur Studios as a Scene Assembler, which is basically a 3D generalist. I do a lot of environment modelling, texturing, lighting, and compositing for game cinematics.

"I enjoyed sculpting this character in ZBrush and modelling all the fine little details in 3ds Max. The skin shader required a fair amount of specific maps denoting specularity, sub-surface colour, and scatter radius to achieve the look I wanted. The biggest technical challenge was creating a good skin shader with V-Ray's Fast SSS2, and I think it could still use some more work."

etdurante@gmail.com

www.eric3dmesh.com

★ Faceless but still very human, the Gladiator is beautifully detailed throughout



Modelling

Using 3ds Max and ZBrush to model

01 Finding realistic reference

I was going for something that was more historically correct than fantasy with my gladiator. I did a lot of research online and in art books. Jean-Léon Gérôme's *Gladiators* (1872) was the main inspiration and the chief reference for this piece, particularly in clothing and tone.



02 Creating a base mesh

First, I wanted to create a good base mesh that I could use to practise anatomy and also have on file for future projects. The body was box-modelled in 3ds Max and once completed exported into ZBrush to add the fine anatomical details.

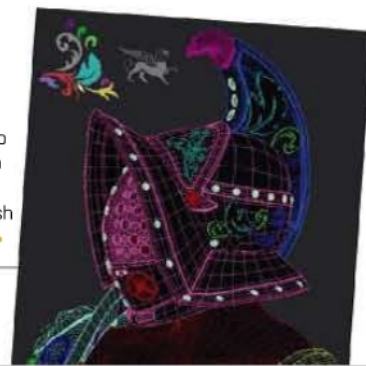


03 Building the armour and clothing

Once I had a good base mesh I could start adding the armour and clothes, beginning with the bigger shapes such as the shoulder pad, helmet, leg guard, belt, and subligaculum (the skirt). All of these shapes were box-modelled.

04 Fleshing out the details

The next step was creating the fine detail. I used splines to trace filigree elements on the helmet and the shoulder pad, plus gryphons for the belt. The details that were too complicated to just box-model were taken into ZBrush. The helmet eagle, leg guard, and shoulder pad lion were all sculpted using ZBrush with normal and displacement maps. »





★ The gladiator's base model will be used in future projects

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your work
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.com

“The Gladiator was a great learning experience because I was able to practise anatomy and study character attire from a very specific time period.”

Textures and shaders

A combination of tools provided realistic surfaces across the model

05 Adding textures to the models

The human body was poly-painted and unwrapped in ZBrush. The armour was done with a variety of different methods depending on their use; parts were unwrapped using Max's unwrapper and some were just box-mapped with a procedural texture. For example, the metals were box-mapped with a procedural metal texture.



06 Creating realistic skin textures

For the body I used V-Ray's Fast SSS2. With the skin shader I kept most of the standard settings and used different maps to control the look. Black and white maps that I painted in ZBrush and Photoshop were used to control the specular and SSS scatter radius amounts. For the SSS colour, I colour-corrected in 3ds Max on my diffuse map to make a deeper red tone map without having to go back into Photoshop.



07 Growing and grooming the body hair

For the gladiator's chest, head and leg hair I used Max's Hair and Fur modifier. I selected and duplicated the separate parts of the body that I wanted to have hair and made the geometry non-renderable. The hair was set to render as geometry so I could then render the whole image as one.

08 Using composite maps for surface detail

I used a lot of composite maps to add in some extra detail. I would add in scratch maps on a separate UV coordinate so I could independently move the composite textures around and place them on the model without touching the base texture.

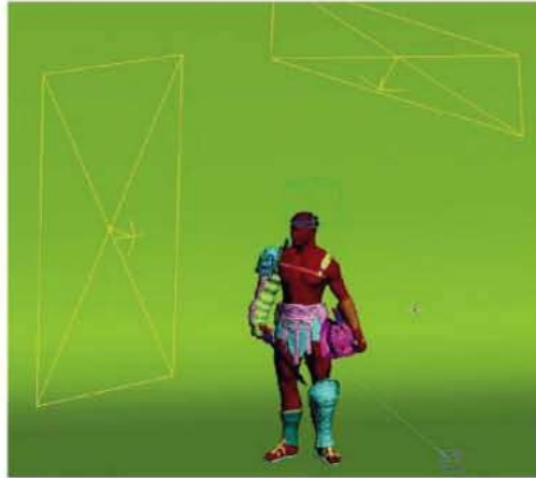
Lighting and post-production

Adding atmosphere and the final visual polish for extra punch



09 Transpose the model

Once all the modelling and texturing was near completion I posed the model using the transpose tools in ZBrush. In 3ds Max I had to do some manual adjustments to some of the clothes to make them sit correctly on the model.



10 Initial lighting set-up

I used two V-Ray lights to light the gladiator: a key and a rim light. The key light was a warm tone that was positioned above him, and the rim light was angled to the back and side of him with a blue tone. V-Ray has an amazing renderer and with a simple set-up you can get some great results.



11 V-Ray render settings

I used Adaptive DMC for the image sampler and V-Ray Triangle Filter as the anti-aliasing filter. Adaptive DMC was set to Min subdiv: 1 and Max subdiv: 8 with the 'Use DMC sampler thresh' option, and gamma at 2.2.

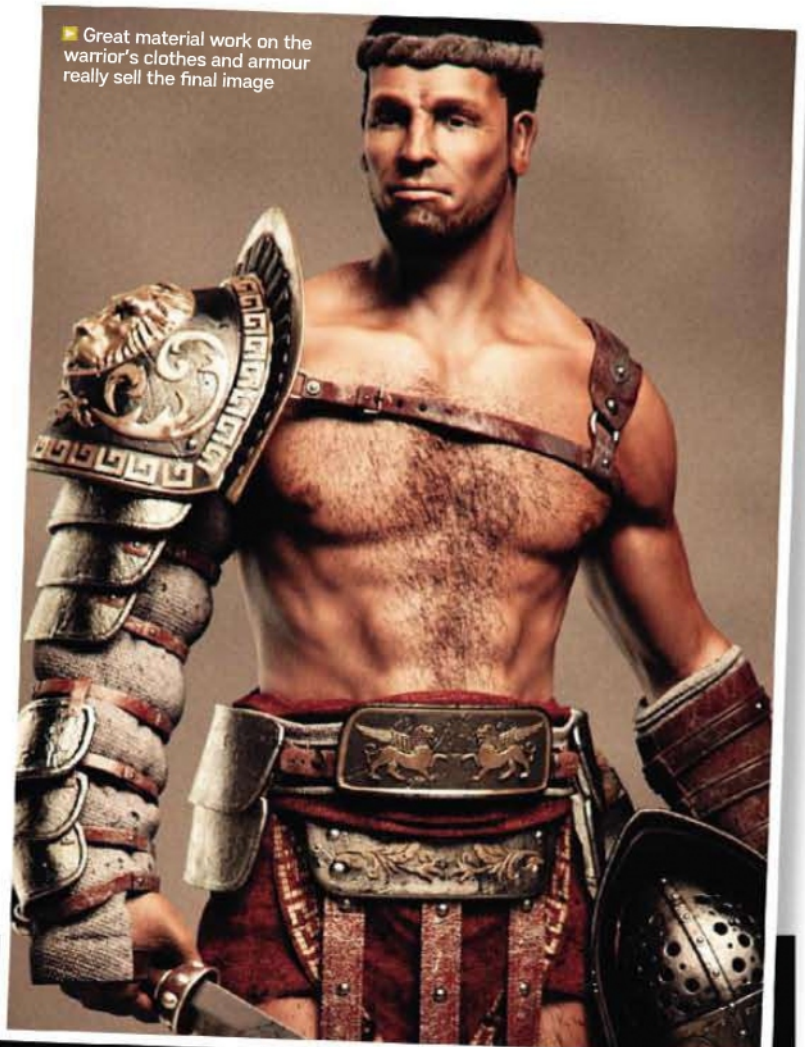


12 Post-production look tweaks

The next step and one of the most important is the post-production process – this is the part where you get to really perfect your image. I usually use Fusion for my post work but with the gladiator I used Magic Bullet LooksBuilder after a recommendation from a fellow co-worker.

13 Finalising the image

The finishing touches were done with Magic Bullet, using an overall warm tone to put the whole image in a certain tonal range. I added a slight vignette and some film grain to the image. I slightly desaturated the image and lastly increased the overall contrast and brightness of the mid-tones.



View more of Eric Durante's work at www.eric3dmesh.com
If you would like to see your work in our portfolio section, send your work to: portfolio@3dmag.com

Short Cuts
The best new
animated shorts
from outside the
major studios

■ Character arcs were important to the directors, despite the film being a short. Both characters experienced a journey – especially the boy, who would initially do anything to get the fruit from the monkey, but in the end, chose to save him instead

Monkey business

Following the completion of the Ringling-produced *The Monk & The Monkey*, directors Brendan Carroll and Francesco Giroladini have landed jobs at DreamWorks Animation. Andy Price finds out why...

The Monk & the Monkey directors Brendan Carroll and Francesco Giroladini completed their ambitious short while studying at Florida's Ringling College of Art and Design, well known for its short and snappy, character-driven student animations. *The Monk & the Monkey* is no exception. It tells the story of Ragu, a young boy on his final path to becoming a monk. His task is to sit and wait for a piece of fruit to fall from a tree – but when a mischievous monkey shows up to grab the fruit, the boy is forced to give chase. When both the monkey and fruit fall from a cliff, the boy has to make a decision: save the fruit and fulfil his life's ambition as a monk, or save the monkey?

The characters and the story evolved naturally throughout the production. The directors spent most time on set-piece shots, only drafting rough animations of the evolving story. The characters themselves also started out completely differently. The young boy was originally a fully-grown Shaolin monk, and the monkey was originally planned to be more beastly and intimidating. In the end, it was decided that both characters had to be of the same age, with the same sort of charm, to cement their later companionship in the short. "The spikes gave the monkey a more foreboding silhouette,

but if it were to step into the light it had the ability to look cute and friendly," says Carroll.

"I like to see it as a challenge, almost like a puzzle," adds Giroladini. "We've been given certain elements to play with, and we have to find a way to make them fit in our world." The resulting style of the characters, specifically the new, 'cute' monkey, were influenced by a range of different sources, but perhaps the most interesting is Giroladini's previous work experience at Pixar. "A big influence was the style of lighting that I was taught there under Jean-Claude Kalache, director of photography on *Up*," he says.

A short of two halves

As a result, *The Monk & The Monkey* switches expertly between twilight scenes, where the monkey is creeping around in the shadows, to the high-energy confrontation between the pair under the glow of the magical fruit-bearing tree. "Strong graphical silhouettes and descriptive colour was the key that kept us hooked on a specific look," says Carroll.

The short itself often feels as if it was made in two parts – because, in essence, it was. Starting off with the atmospheric introduction of the young boy being told the nature of his quest, the short switches gear



to the confrontation with the monkey that leads to the high-octane chase sequence. The two directors split these sections in half, and took one each. Giroladini is looking for a future in lighting and took the first segment, while Carroll, who wants to work in animation, took the second.

Carroll says that Maya, the workhorse behind the short, was invaluable for scenes such as the cliff sequence. "Maya has a fantastic, non-destructive animation workflow. The set had to be remodelled and redressed quite a lot, so the cameras and animation had to be moved around. All I had to do was create a new layer of animation linked with the camera animation and character placement node, and shift it wherever the newly created state was."



VITAL STATISTICS

Title *The Monk & The Monkey*
Duration 4:27
Website monkmonkey.com
Directors Brendan Carroll and Francesco Giroladini
Budget \$250,000
Production time 13 months
Software Maya, Photoshop, Nuke, After Effects
Synopsis A child is sent up a distant mountain by his master to fulfil his last task before becoming a monk
If you like this, watch...
Jack Jack Attack, Brad Bird, 2005
Website tinyurl.com/shortcuts139

**KEY TECHNOLOGY**

Nuke was a key element in finishing the short without any flickering effects, stray artefacts or bad deformations. Tackling these issues within Maya would have taken too long when the directors were working to a tight deadline. Workarounds included taking a piece of the render that was correct and using it to patch the surrounding frames that had errors. Lighting was also improved in Nuke by outputting several ID mattes from Maya to colour-correct each element separately.



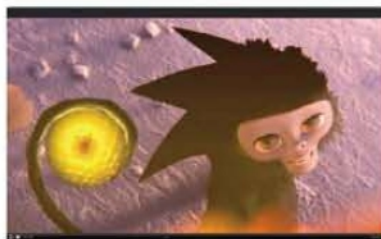
■ The two directors worked individually on animation and lighting. Francesco Giroladini was the lighting expert during the first half of the film: "I kept the characters in pools of shadows so I could achieve a softer look by lighting them with soft bounce lights"

For Giroladini, it was Pixar's RenderMan that made life easier. "Its point-based global illumination was a feature that made lighting a true pleasure," he says. "It allows the sets to do a lot of the lighting work themselves." By paying enough attention to the shaders and by adjusting just a few settings, he was able to overdrive the colour bleeding on certain objects to achieve effects that would otherwise have to be replicated using expensive lighting techniques such as area lights or raytraced point lights.

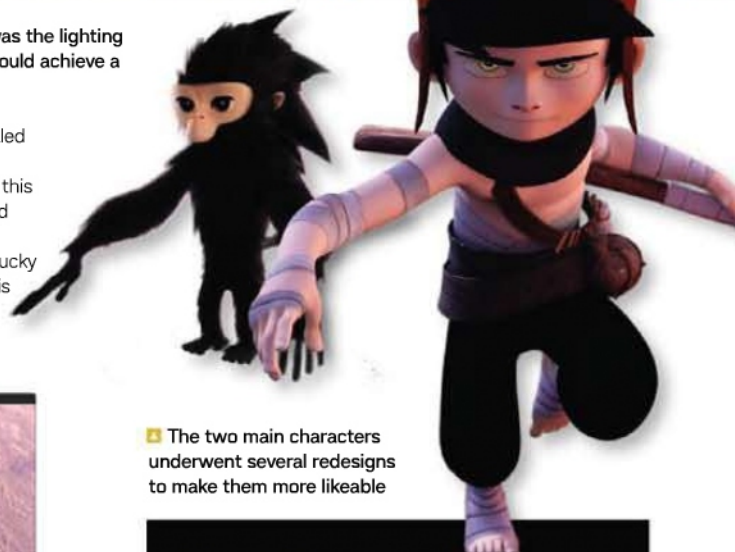
In the end, the hardest part of *The Monk & The Monkey* to get right was the finale, in which Ragu returns, admitting failure at reaching the fruit as a result of saving the monkey. It went through four or five iterations while the directors decided what made the whole short most satisfying. They toyed with the idea of Ragu returning in tears, but that would negate his journey to becoming an adult. They also thought Ragu could construct an elaborate excuse, but it didn't quite work. In the end, they left Ragu as a noble and modest character, admitting

he had failed, before the monkey is revealed to have been his test.

The two directors' sheer dedication to this project was not wasted. Both have landed jobs at DreamWorks Animation: Giroladini worked on *Megamind*, for which he was lucky enough to light eight shots, while Carroll is set to work in the layout department for *Madagascar 3* – and there's already talk about another collaboration. ■

**WATCH THE ANIMATION**

You can view *The Monk & The Monkey* in the Animations section of our website tinyurl.com/shortcuts139



■ The two main characters underwent several redesigns to make them more likeable

**Send us your shorts**

To submit work for inclusion in Short Cuts, contact us at the address below, attaching a brief synopsis and at least three stills
enquiries@3dworldmag.com

Inbox

This month: where to find cheaper mocap, and are multi-part tutorials evil? Let us know at inbox@3dworldmag.com



FACE TIME

I am really getting into animation and rigging and the whole CG process in my spare time. I'm making a full one- to two-minute animation, and want some really good facial animation. I'm thinking motion capture would be good, but the cheapest system I can find is around the \$6,000 mark, which is very expensive for me at the moment. I was wondering if you knew of any cheap set-ups that get a good amount of data.
Tarik Ali, via email

It just so happens that we recently reviewed two very affordable mocap systems: iPi Desktop Motion Capture (see issue 136), which is a markerless, full-body capture app, and Zign Track 2 (see issue 138). iPi DMC isn't exactly a snip at \$1,000, but it's way cheaper than pro systems (and you can try winning one in this very issue – see page 54). Zign Track can probably fulfil your facial motion capture needs, and the base version is just \$230.

■ Motion capture systems have always been expensive, although newer systems such as Zign Track can deliver great results for much less outlay

FUNDAMENTAL FLAW?

I recently read the articles on the fundamentals of render passes. This article was spread over six issues, each issue covering one or two passes with an accompanying video.

What is the purpose of this? The cynic in me would say it's to sell more magazines. We are not kids with short attention spans so why spread a good article over so many issues, resulting in diluting the message and losing the reader's interest? I find the best articles from 3D World are the multi-page articles with lots of interesting information, and I enjoy reading it in one sitting while having lunch.

Ken Tu, via email

There are several reasons for splitting the Fundamentals series into several parts, the main one being that it gives the author time to create scenes and author all the video tutorials, rather than having to do it all in one go. Yes, of course we'd like readers to come back each month to see the next part. But if this is annoying, we can certainly look at different ways of doing it – what do other readers think? ■

Letter of the month



Write in and win!

Paul wins a copy of Digital Art Masters 5, a sumptuous in-depth look at the work of some of the best in the industry
3dtotal.com



■ Our reviews are useful, but nothing beats hands-on experience with the software

WHICH APP?

As a current user of LightWave, I'm in the market for a new piece of 3D software. I'm currently looking at the three big boys, which all belong to Autodesk: 3ds Max, Maya and Softimage. Being a life-long collector of your magazine, I remembered that recently you released one issue which reviewed all three of those packages [issue 133], so I dug it out. Unfortunately, after reading them I'm none the wiser as to which package to go for.

The one problem that all three reviews have is that they focus mainly on what the new features are and what new improvements were made. This is of course good for a review, but it is only useful if you are already aware of what power these packages already have.

So, 3D World, I'd like to ask you if you could please do a detailed roundup of the 3D packages on the market. Give us a complete rundown on them all, what they are like, where they are strong and where they are not – and if possible, say which areas each package excels in.

I know folks would say to download the demos and check them out, but with a 30-days trial period, it's not always possible to get a feel for a package in that time. So a complete and detailed roundup of the packages would be very much welcomed.

Paul Boland, via email

It's not a bad idea, but we're not sure even that would help. Truth is, no one package will do everything brilliantly, and it's a very personal matter which app you feel most comfortable with. Certainly if character animation is your thing, Maya is probably the way to go – but we've also seen people who can do brilliant CA in LightWave, yet might struggle to make a basic scene in Maya. Why not download the demos, spend your 30 days with each creating the same scene in all of them, and see which one suits you best?

3D World forum

Go online to talk about the hottest 3D trends and share tips. There's a Creative Challenge every month for you to flex your 3D muscles on:
3dworldmag.com/3dworld-forum

■ Congratulations to Lasarus29, who won the challenge to design 3D World's 'HQ of the future'

3D WORLD
Creative Challenge
WINNER



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Pre-Viz Commentary and analysis from the CG industry

► The real-time browser-based action RPG Ostrova Online uses the Alternativa3D 8 engine, suggesting how Molehill APIs could revolutionise Flash gaming



Flash forward

As Adobe unveils plans to take its flagship web multimedia technology into the third dimension, developers reveal how they think Flash 3D APIs will impact creative industries



► MAX Racer by the developer AlternativaPlatform (alternativaplatform.com) was created for the MAX 2010 conference, showcasing how advanced Flash gaming might evolve in 2011.

Unveiled at Adobe's digital media conference MAX 2010, a technology codenamed Molehill has the 3D, web and gaming industries buzzing. Unlike Flash Player 10, which enables 3D effects to be applied to 2D content, Adobe's GPU-aided APIs take Flash fully into the 3D arena. Adobe Labs offers tantalising figures: Flash currently renders thousands of non-Z-buffered triangles at about 30Hz, but with Molehill, you get hundreds of thousands of Z-buffered triangles in HD resolution at 60Hz.

The Molehill APIs will be available to developers through various 3D frameworks. "This is great news for the platform," says Phi Digital creative technologist John Dalziel. "Performance has always been Flash Player's Achilles heel. While Molehill APIs are only designed to improve graphics rendering, this should have an overall improvement on performance." Away Media director Rob Bateman adds: "Adobe's goal is

targeting over 95 per cent of existing computer hardware's GPU capabilities, so Flash Player will still maintain its compatibility and ubiquity."

Early tests seem to confirm Adobe's claims, enabling a previously unheard-of level of polish in Flash 3D projects. "We've pushed out millions of shaded triangles in real time," says Flash specialist and Away3D.com team member Richard Olsson. "Issues we had with 'old school' Flash, like Z-fighting, are solved automatically by native approaches to 3D, such as Z-buffering."

Such superior 3D finishes should boost the creative possibilities of online 3D in the eyes of clients and widen the scope of what's feasible. B-Reel senior interactive designer Robert Järvi foresees an online 3D revolution: "You'll see the technology in high-budget campaigns, from brands willing to try something new – branded 3D worlds – through to innovative interactive ways of displaying products." Smaller elements will also benefit: currently, B-Reel uses various third-party 3D solutions for smaller Flash components, but Järvi thinks Molehill will help creatives "efficiently make those components slicker, with more depth and dynamics".

Centresource interactive designer Jared A Scheel foresees an explosion in creativity. "By utilising the GPU to render complex 3D scenes, Molehill will allow designers to think more about an experience and less about the technical limitations imposed by poor performance." ConixGames Director John Denton notes that Molehill could even free 3D from being suitable only for large dev teams: "3D has



▲ Built-in 3D Flash APIs should enable many more developers to follow in the footsteps of the Ostrova Online project

[presented] technical and financial barriers to entry. As these are removed, the scope for other forms of entertainment, art and experimentation to emerge will increase exponentially."

However, nerv interactive developer Greg Price urges a degree of restraint despite the excitement surrounding the technology. "There's danger in developing everything in 3D just because you can. Use the right tools to create the best user experience."

Playing the game

Gaming is an obvious area where Molehill should thrive. Notably, it's also an area in which Flash

Casley thinks Molehill's rendering clout could move Flash into the same weight division as the fast-growing development tool Unity: "While Unity is a strong contender for speed and complexity, it will lose out to Flash's penetration." He adds that another feather in Flash's cap is Adobe's revelation about "work on native controller support in web and desktop runtimes, giving users a familiar interface to engage with while gaming". Plug-in Media technical director Seb Lee-Delisle adds: "Hardware-accelerated graphics built into Flash Player should push web games towards console quality, and with Molehill APIs using DirectX on

Any sharp increase in 3D gaming and web applications isn't only a boon for developers: it also opens the door to many more CG artists. "The quality of assets in 3D Flash games has been relatively poor, due to the limitations of the tools we've had," says Greg Price. "With Molehill's performance, we'll see more polished 3D Flash solutions, which will require higher-quality 3D assets."

While Flash teams might once have been able to create said assets themselves, the "greater level of skill required to model and texture 3D assets accurately, and Molehill leading to more animated 3D content, means we'll see the outsourcing of more 3D assets," reckons nerv senior interactive developer Dave Lambton.

Of course, there are question marks. Flash games don't require a publisher, but nerv digital production director Ringo Moss notes: "Monetising Flash content has always been difficult, so manufacturers could be hesitant to buy into something that they could only control on a subscription basis." He hopes Adobe might work closely with manufacturers to fashion an online game store, maximising potential growth.

"Molehill will allow designers to think more about the experience, and less about the technical limitations imposed by poor performance"

Jared A Scheel, interactive designer, Centresource

has struggled to date. "Building 3D Flash games has always been tricky, due to the limitations of how many triangles it can draw to the screen," says ConixGames director Mat Groves. "For the 3D engine for Skid Mk, I used every trick in the book to make the game look as 3D as possible. I'm looking forward to making sweet games rather than focusing on squeezing triangles out."

Code Computerlove Flash developer Jono

Windows and OpenGL on Mac, I'd expect similar performance to Unity."

In removing the rendering bottleneck and opening the door to more complex, console-style Flash games, the perception of web games as throwaway entertainment will be gone. The nature of the technology should also enable smaller teams, rather than just industry giants, to utilise 3D regularly in web games.

Bad Apple

Potential's one thing, but a lack of iOS in-browser plug-ins and rapid evolution of web standards has recently seen Flash take a hammering. The general consensus, though, is neither trend poses a de-facto threat to Flash. At most, Flash looks set to be repositioned, once again becoming a tool for more specialist tasks. »

■ PRE-VIZ Flash 3D framework



■ Skid Mk (skidmk.com) runs on a bespoke rasteriser-based engine, maxing out at a couple of thousand triangles. Its creators think a Molehill equivalent would significantly boost its graphical calibre



Seb Lee-Delisle thinks this is good: "Areas where Flash is getting squeezed – slideshows, animated interactions, video – were never a great use for it anyway. Maybe we can now focus on what Flash is great at – gaming and rich immersive experiences." Mat Groves agrees: "With proper 3D, Flash will compete with the likes of Unity. When features such as peer-to-peer networking are released, it will blow the door open for 3D multi-player games."

With inconsistent or nonexistent browser support for WebGL and hardware acceleration for native standards, Molehill could take an unassailable lead in online 3D. "Judging from historical data, it'll only take a few months to reach over 70 per cent of users," claims Richard Olsson. "This means most internet-connected devices could support GPU-accelerated browser-based 3D before the end of 2011."

"I do mainly 3D-related work on the web, so I know there's a big demand for 3D showcases and other commercial applications"

Richard Olsson, Flash specialist, Away3D.com



■ Shown at Adobe's MAX 2010 conference, Away3D's Fractal Tree demo uses the Molehill APIs to shift up to four million triangles. View it online at tinyurl.com/3dw-away3d

Whether the Flash community – and, indeed, Adobe – can capitalise on Molehill remains to be seen, and will depend on the accessibility of the technology. Digital Outlook lead creative developer Tadhg McCarthy isn't the only person to suggest that "the APIs for Molehill are very low-level", concluding that they're not intended for use by most Flash developers.

Rob Bateman suggests that this is actually a good thing: "The biggest gain will be the perceived credibility this gives 3D in Flash, in the same way ActionScript 2 gave credibility to ActionScript. Attracting developers from other languages will be key in Molehill's early stages, with OpenGL and DirectX knowledge forming the basis of a new breed of 3D engines developed

with Molehill APIs." Molehill's extensibility, combined with Adobe's willingness to work with established names in the Flash community, such as Alternativa and Away3D, means Flash coders should be able to take advantage of Molehill merely by upgrading their preferred 3D engine.

Time will tell whether Adobe and others go further in opening up Molehill. Dave Lambton wants to see Adobe "implement a wrapper engine like Away3D directly into the API", and others want the creative giant to go further. "I want support in the vein of a GUI for 3D artists – anything that allows me to take on the majority of art-related responsibilities, so the coder can focus on what they do best," says ConixGames artist Matt Allan. "If Adobe wants Flash 3D to be taken seriously, designers should be able to set



■ A Centresource project for Warner act John Rich involved a virtual house party. Sections contained 2.5D pictures and videos; but Centresource says Molehill would have reduced CPU use and also provided scope for more creativity

RESOURCES

START PREPARING FOR ADOBE'S 3D DEVELOPER FRAMEWORK FOR FLASH

Adobe Labs

Basic info on Molehill and FAQs answered
labs.adobe.com/technologies/flash/molehill

ByteArray

Hours of Molehill sessions, as shown at MAX
bytearray.org/?p=2346

YouTube

Video of game controllers and Molehill, recorded at MAX 2010
youtube.com/watch?v=KINKJbDrYdU

SavageLook

Nice online compilation of 3D graphics and gaming demos
savagelook.com/blog/away3d/adobe-molehill-3d-api-videos

Away3D

Post about Away3D's Molehill work
away3d.com/away3d-adobes-new-3d-api-molehill

Alternativa

Peer-to-peer 3D Flash gaming in Molehill with MAX Racer
blog.alternativaplatform.com/en/2010/10/29/peer-2-peer-multiplayer-in-max-racer-showcase

up scenes in a visual manner, without delving deep into code. Without such support, you'll see few projects surpass the quality shown in existing Molehill demos."

Such accessibility is in everyone's interest – especially Adobe's. Bateman says that Molehill's in a similar position to where Flash once was with video: "When Flash 8 arrived, there was this huge shift, and Flash grabbed 75 per cent of web video. With Molehill, the same could happen with 3D."

As Robert Järvi concludes: "This might be exactly what Flash needs to stay in the game. And – finally – we'll see stunning 3D graphics in the browser." ■

More than just a pretty face.



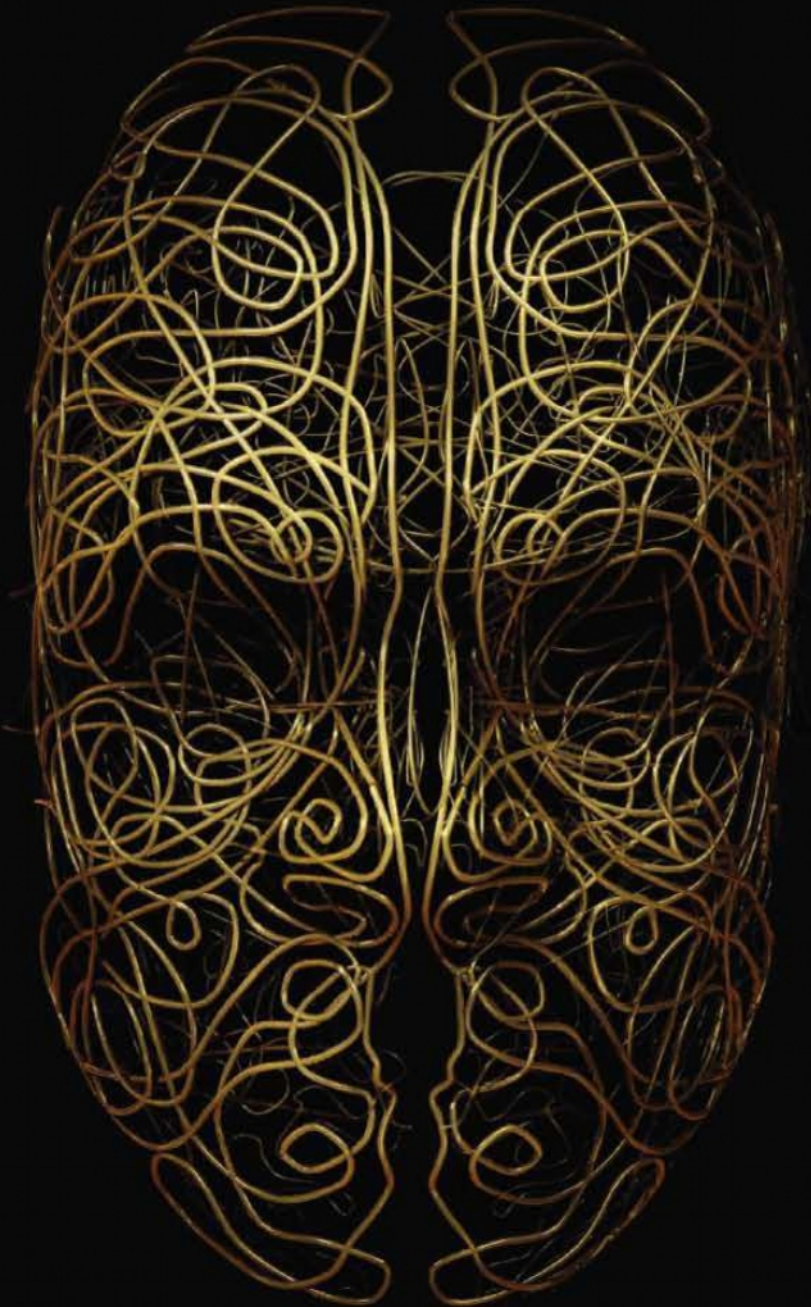
Flesh out the concept
with 3D characters



Let the technical go and
your creativity flow



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The Filter

Our pick of the past month's 3D software and training resources, ruthlessly stripped of PR hyperbole. Visit 3dworldmag.com for more product stories and all the breaking news



SynthesEyes 2011

DEVELOPER: Andersson Technologies

WHAT IS IT? Extensive update of the camera tracking and motion capture software

WHAT'S NEW?

- Texture extraction system for texture maps and panoramic backdrops
- Set reconstruction, with alpha channel painting, improved mesh creation and UV mapping
- Overhauled UI and navigation enhancements

THEY SAY: "Visual effects artists can create 3D models of the set on which shots were originally recorded, as an aid to adding effects such as CG creatures or set extensions. Compositing artists can use the new features to build layered 3D environments as well"

WE SAY: The new set reconstruction tools sound incredibly useful for seamlessly adding VFX.

Fortunately, it has retained the affordable price

PRICE: \$399 (32-bit), \$599 (64-bit)

MORE ONLINE: ssontech.com



modo 501

DEVELOPER: Luxology

WHAT IS IT? Update to the subdivision surface modeller and renderer

WHAT'S NEW?

- Enhancements to renderer and real-time previewer for faster, noise-free images
- Multi-res sculpting plus Pixar's Psub technology
- UV distortion view, enhanced modelling tools
- RayGL for interactive raytraced preview
- Free Enhance procedural presets

THEY SAY: "With 501 people were telling us not to add new features but to make everything better; to 'make everything more modo'"

WE SAY: Not all modo owners will want (or need) this upgrade, but power users will appreciate the numerous bug-fixes, speed-ups, modelling enhancements and workflow improvements

PRICE: €995 (€395 upgrade)

MORE ONLINE: luxology.com



CityEngine 2010.3

DEVELOPER: Procedural Inc.

WHAT IS IT? Update of the procedural city builder

WHAT'S NEW?

- Direct export to E-on's Vue software as .VOB
- New procedural operations for urban planning
- Terrain editing and export as mesh object
- Improved OpenStreetMap import
- Medieval town example for download

THEY SAY: "CityEngine provides professional users in entertainment, architecture, urban planning, GIS and general 3D content production with a unique conceptual design and modelling solution for the efficient creation of 3D cities and buildings"

WE SAY: This is really smart, crowd-pleasing update with serious tools for planners, and terrain editing and export to Vue for CG artists

PRICE: Free update, \$495 (Indie version), \$1,695 (Studio version), \$4,950 (Pro version)

MORE ONLINE: procedural.com



Instant Roof for SketchUp

DEVELOPER: Vali Architects

WHAT IS IT? Automated roof-creating script which adds tiles and fascias

MAIN FEATURES

- Multiple roof types supported
- Create customised roof styles
- Complete mission tile or standing-seam roof
- Export and import user-defined roof styles
- Hips and rafters with customisable ends

THEY SAY: "Create a complex roof in seconds – just select faces and edges, then run Instant Roof. Creates hip, gable, shed, dutch-gable, mansard, plantation, gambrel, open-trellis, combined, more..."

WE SAY: It's the little gems such as this script that can remove much of the drudgery from typical visualisation jobs. The pro version features a wider range of roof slope angles compared to the free one

PRICE: Free (pro version €39)

MORE ONLINE: tinyurl.com/38k8lan



messiahStudio 5.0

DEVELOPER: pmG Worldwide

WHAT IS IT? The latest version of the character animation and rendering package

WHAT'S NEW?

- Updated character animation and workflow
- Dynamic Render interactive rendering
- Sketch mode
- Particle instance creation
- UV bake render

THEY SAY: "Whether you come from Maya, Softimage, 3ds Max, LightWave or another CG software, you'll be amazed by messiah's innovative smart bones, real-time feedback, plug-in ability and low learning curve"

WE SAY: It's never going to replace the Big Four packages, but messiah is certainly well-established now as an excellent character tool, so a new version is always welcome

PRICE: \$1,199 (pro), \$499 (basic)

MORE ONLINE: projectmessiah.com



Terragen 2.2

DEVELOPER: Planetside Software

WHAT IS IT? Updated natural environment modeller and renderer

WHAT'S NEW?

- Optional wireframes in 3D preview
- New cloud control inputs and localisation controls
- Raytraced atmosphere option
- Cloud shadow maps

THEY SAY: "We've dedicated more than a decade to specialising in algorithms that simulate skies, outdoor lighting, terrain textures, and render extremely large and detailed terrains. This release includes new features that improve workflow, expand flexibility and power, and increase rendering speed for all users"

WE SAY: In the right hands, Terragen's output is second to none in terms of sheer realism – so it's good to see more handy features being introduced. Still no sign of procedural vegetation though

PRICE: \$299

MORE ONLINE: planetside.co.uk



Catastrophe

DEVELOPER: Nitroman

WHAT IS IT? Dynamic object fracturing plug-in for Cinema 4D R12

MAIN FEATURES

- Automatic mesh breaking to generate realistic fracturing structures
- Pyrocluster-based dust from collisions/explosions
- Can break objects into thousands of pieces
- Provides control over the uniformity or localisation of fragments

THEY SAY: "Catastrophe is a new fracturing and breaking plug-in for Cinema 4D R12 from the creator of Thrausi and Xbreaker"

WE SAY: You no longer need to master Houdini to create good-looking destruction VFX. Coupled with C4D R12's new dynamics and Pyrocluster, this little plug-in is about as much fun as CG gets...

PRICE: €15 (donationware)

MORE ONLINE: nitro4d.com



MoClip

DEVELOPER: NeoReel inc.

WHAT IS IT? Updated online mocap marketplace

WHAT'S NEW?

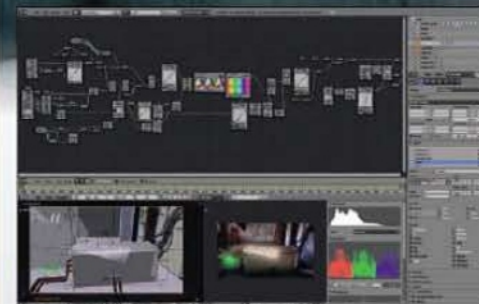
- Improved intelligent blending
- Animation uploads from Maya or MotionBuilder
- Enhanced search engine and features
- Public request and royalty programme

THEY SAY: "MoClip is a cloud computing animation service, which makes archiving, sharing and mixing character animations a fast and easy task. MoClip can drastically speed up projects like previsualization, cinematics, crowds, and the like, without many changes to an existing pipeline"

WE SAY: This online system provides an easy and affordable way of adding motion capture to your CG project, and is ideal for small studios. Looks like Animeeple has some competition

PRICE: Free (mocap files priced individually)

MORE ONLINE: moclip.com



■ Learn the ins and outs of compositing in Blender, from combining simple passes to fully integrating CG with live action

Training product of the month

Blender 3D Compositing

PUBLISHER: cmiVFX

Learn the entire compositing process for Blender in this new training video from cmiVFX. The content covers a range of topics such as working with 3D and rendering, using tracked data from an external tracker, and colour correction.

The training session aims to set up the user with the core concepts needed to be a successful compositor, seamlessly integrating fully three-dimensional CG into real footage. Over the five hours of training, you'll learn how to setup multiple render layers in a multi-scene workspace with individual render settings, how to deal with AlphaOver, premultiplication and the different blend modes, and how to recombine all available render passes into one final image and enhance them with curves and colour-balance tools.

PRICE: \$49.95

MORE ONLINE: tinyurl.com/trainingprod139

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The revolution will be televised

The budgets and team sizes may be a fraction of those in movie effects, but long-format broadcast work offers unique opportunities for ambitious artists. **Jim Thacker** investigates how the two sectors differ – and what we can all learn from TV VFX



Going by what you see in the press, you could be forgiven for thinking that VFX jobs come in units of 30 seconds or three hours, and nothing in between. While the mainstream media scarcely acknowledges the existence of visual effects outside of Oscar season, the pages of magazines like 3D World are filled with stills from high-gloss, high-impact, and defiantly short-form commercials work.

Yet there is a middle ground. On both sides of the Atlantic, crack teams of artists are creating the effects that underpin some of the world's best-known TV shows. Their work spans a range of genres and visual styles, from medical drama to science fiction. The results are seen by millions: through worldwide syndication, more people will

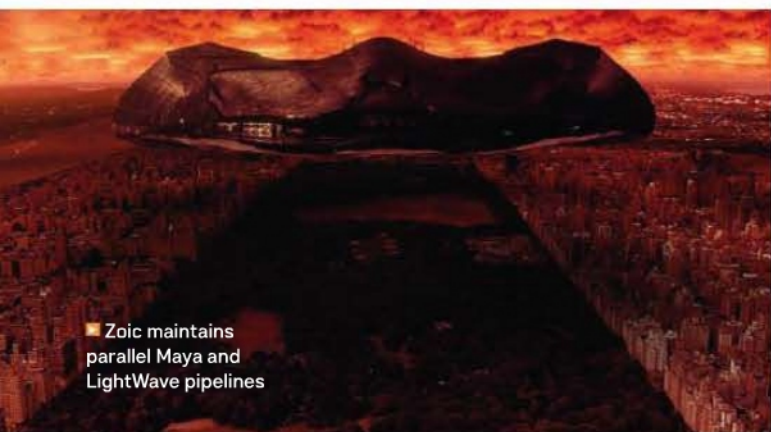
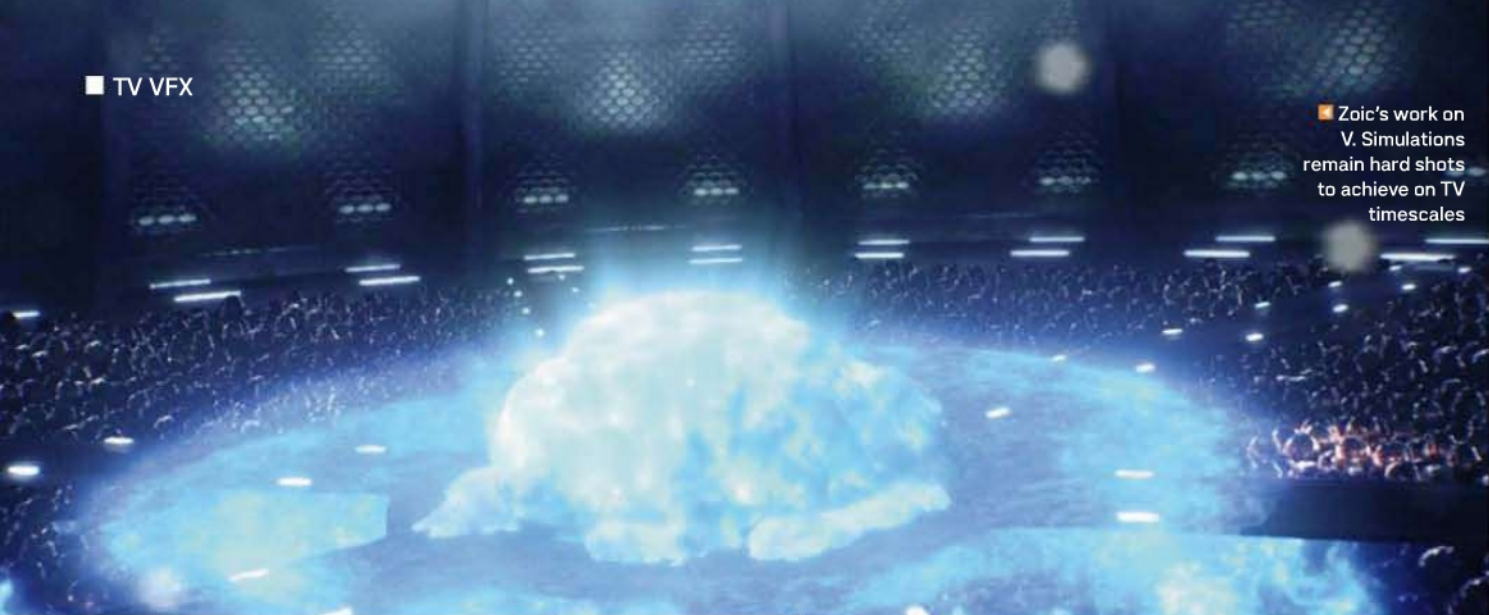
watch Doctor Who or CSI than all but the biggest of Hollywood blockbusters.

So this issue, 3D World sets out to celebrate these unsung heroes. We talked to five leading effects facilities to find out about the highs and lows of broadcast work, the technical tricks they use to get shots completed faster and more efficiently – and ultimately what every artist can learn from TV production.

THE NUMBERS GAME

First, some cold facts. Budgets for broadcast work are a fraction of those in film. None of the studios we spoke to were keen to disclose their actual fees for recent shows, but their estimates for how much an equivalent number of shots would cost if »

■ Zoic's work on V. Simulations remain hard shots to achieve on TV timescales



■ Zoic maintains parallel Maya and LightWave pipelines

completed for a Hollywood movie ranged from ten to a hundred times greater.

The situation is particularly acute in the UK, where the number of effects-heavy shows is far smaller than the US. Whereas 10-15 major long-format effects series are completed in the States each year, Britain has historically had two flagship VFX shows: the BBC's *Doctor Who* and ITV's creature-heavy science-fiction drama *Primeval*.

"Using *Primeval* as an example, we delivered over 1,000 shots in one series, and you're talking around a tenth of [what it would cost to do the same shots in a movie]," says Framestore's Christian Manz. Manz is well placed to comment: as VFX supervisor on both

Primeval and *Harry Potter and the Deathly Hallows: Part 1*, he has a foot in both camps.

In addition, while movie budgets build in average costs – additional fees paid if the actual volume of effects work exceeds the producers' initial estimate – broadcast work tends to be done for a flat fee.

"Shows have a fixed budget, agreed up front," says Manz. "Whereas in films, there will always be a contingency for overages. [In TV] there is a cost, and you do it for that cost."

This would be less problematic if studios knew exactly what it is they were bidding on. But with broadcast's tight production schedules, it isn't uncommon for a company to have to pitch on a

at a horizontal resolution of 1,920 pixels. Even with movies shot at 4K resolution, the footage is often scanned – and effects work completed – at 2K, making the difference in raw resolution negligible.

The scale of the effects reflects the scope of the work. "The TV audience compares the results to film. They don't compare *Primeval* to *Doctor Who*, they compare it to *Jurassic Park*," says Manz. "There is an inverse relationship between budget and ambition."

TEAM SIZES AND TIMESCALES

So what effect does this combination of high ambitions and low budgets have on the studios engaged in TV work? For a start, teams are smaller. While the volume of shots completed by an individual studio is usually higher for broadcast projects than for movies, fewer artists can be assigned to the job. According to our straw poll (see *Vital Statistics*), the ratio of shot count to team size is between 10 and 60 times higher for broadcast than film, while time available per shot is much lower.



■ Artists at Zoic 'tag team' the production of assets from modelling to lighting

“With episodic work, we'll gravitate to whatever app is needed to get the job done. More often than not, it's about the talent behind the tool, not the tool per se”

Paul Ghezze, 3D supervisor, Zoic Studios

project before all of the episodes in a series have been scripted. While effects houses can stipulate a total maximum number of shots, disputes over unforeseen changes aren't unknown.

Thus profit margins can be very tight. While no one wanted to say so publicly, studios have been known to take a calculated loss on a job on the assumption that they will be able to recoup their investment if a show is recommissioned for further series.

But at least TV effects work is done at a lower resolution to film, right? Wrong. With the advent of high definition, modern broadcast work is delivered

This fact is reflected in exactly who does the work. Although there are major studios – such as Framestore and MPC – that do both film and long-format broadcast work, many TV jobs are completed by smaller houses. Even The Mill – at around 100 staff, the UK's largest broadcast specialist – describes itself as “in some respects, little bigger than a boutique”.

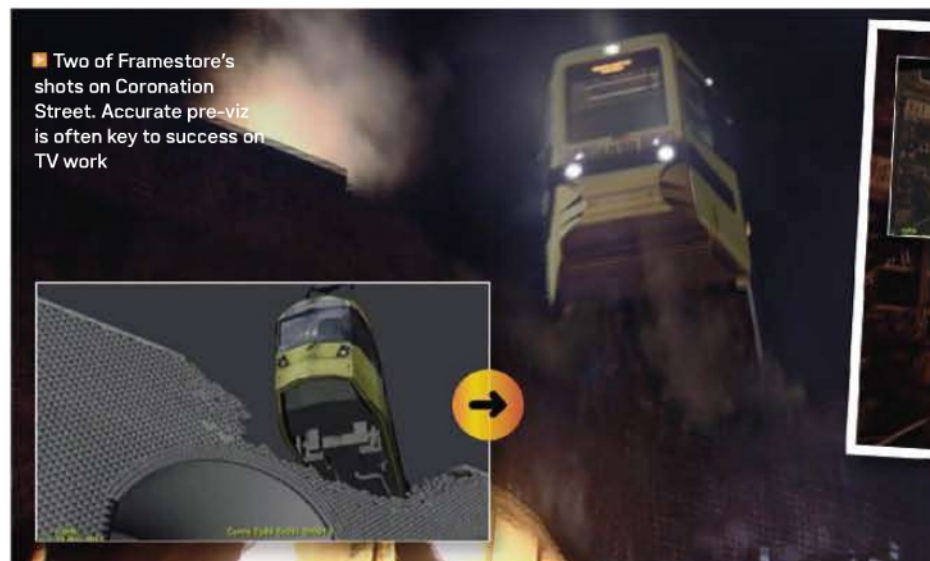
Over in the States, this group of small-to-medium-sized broadcast facilities includes Eden FX, Entity FX and Zoic Studios: the multi-award-winning house responsible for effects on primetime US dramas

Vital Statistics

HOW DO TURNAROUND TIMES AND TEAM SIZES COMPARE BETWEEN TV AND FILM EFFECTS? OUR STRAW POLL OF RECENT PROJECTS REVEALS ALL

TITLE	BROADCASTER	RUNNING TIME	VFX STUDIO	DELIVERY TIME	NO. OF VFX SHOTS	PEAK TEAM SIZE	Shots per team member
BROADCAST							
Outcasts (2011)	BBC	8 x 60 mins	Darkside Animation	10 months	318	16	19.9
V (Series 1)	ABC	12 x 60 mins	Zoic Studios	2/3 Weeks/ep	200-400/ep	20	180.0
Primeval (Series 3)	ITV	10 x 50 mins	Framestore	12 months	1,000+	60	16.7
Doctor Who (Series 4)	BBC	13 x 45-65 mins	The Mill	12 months	1,400	50	28.0
Planet Dinosaur (2011)	BBC	6 x 30 mins	Jellyfish Pictures	18 months	3,000+	50	60.0
FILM							
Prince of Persia	N/A	116 mins	Framestore, others	24 months*	120*	120*	1.0
2012	N/A	158 mins	Double Negative, others	11 months*	203*	90*	2.3
Clash of the	N/A	106 mins	MPC, others	14 months*	250*	100+*	2.5
Avatar	N/A	162 mins	Weta Digital, others	34 months*	1,852**	900**	2.1

*For named studio only **For entire production



■ Two of Framestore's shots on Coronation Street. Accurate pre-viz is often key to success on TV work

including CSI, True Blood, Mad Men and the recent remake of V. Zoic is notable in that it illustrates one of the effects that staffing levels can have within a studio: the tendency for artists to occupy multiple job roles.

"Typically, movies will find specialists to do jobs," says 3D supervisor Paul Ghezze. "Zoic's mentality, more often than not, is to go with generalists: people who can do all the disciplines from modelling and texturing to lighting and rendering, and possibly even animation or effects."

While the distinction isn't absolute – several of the studios we spoke to said they crewed up for TV and movies in exactly the same way, and even Zoic usually employs specialist animators, effects TDs and compositors – it does indicate the degree of creative ownership possible in broadcast. Whereas film artists will typically only work on a small part of a shot, their broadcast counterparts may take it almost all the way through production.

"You don't have a stable of guys with a task list of models to crank out over months," says Ghezze. "Typically a couple of staff will tag-team the work: create an asset, texture it, light it, and take it all the way through the shot." With production responsibilities falling heavily on individual artists,

there is a greater incentive for studios to permit those artists to use the tools they feel comfortable with, rather than standardising on a particular software package.

TOOLS OF THE TRADE

"With episodic work, we'll gravitate to whatever application is needed to get the job done correctly," says Ghezze. "More often than not, it's about the talent behind the tool, not the tool per se."

This is reflected in the range of software used. Whereas film work tends to be standardised around Maya, Houdini, RenderMan and Nuke – assuming that the studio is even using off-the-shelf software – the list of packages used by our interviewees for this feature included 3ds Max, 3D-Coat, After Effects, Arnold, BodyPaint 3D/Cinema 4D, Brazil r/s, Houdini, LightWave 3D, Maya, mental ray, messiahStudio, Mudbox, Nuke, Photoshop, RealFlow, Softimage, V-Ray, Vue and ZBrush.

That's between just five studios – and it doesn't include specialist plug-ins. While cultural differences come into play here – studios that do both movie and broadcast work tend to use the same tools for both, and American studios have historically mixed and matched more than in the UK – it does illustrate the



■ Not all TV work is episodic. For the 50th anniversary edition of UK soap opera Coronation Street, a team of 13 at The Mill completed 18 shots on a spectacular tram crash, including a full 3D vehicle and digital environments behind the viaduct, revealed by a virtually-extended crane move. "It was a uniquely high profile job," says The Mill's Will Cohen. "We knew the biggest audience of the year would be watching." In the event, 14.58 million people tuned in – half the UK's viewing population.

Jellyfish Pictures is using 2.5D environments on Planet Dinosaur

Almost all backgrounds are digital, with no time to shoot backplates



pragmatic approach adopted by broadcast facilities.

"We've always had that attitude of 'Do it with whatever does it best' rather than throwing a lot of money at the problem," says Andy Bishop, managing director of veteran UK effects house Darkside Animation. "Even when [most of the rest of the industry] was working on SGI Onyxes, we were using Amigas and PCs."

With long-format credits including BBC dramas Spooks and Hustle, Darkside is currently sole effects



10 tips for faster effects

IN BROADCAST, GETTING SHOTS DONE QUICKLY ISN'T JUST EFFICIENT – IT'S ESSENTIAL. HERE ARE TEN TRICKS THE PROS USE TO INCREASE THROUGHPUT

01

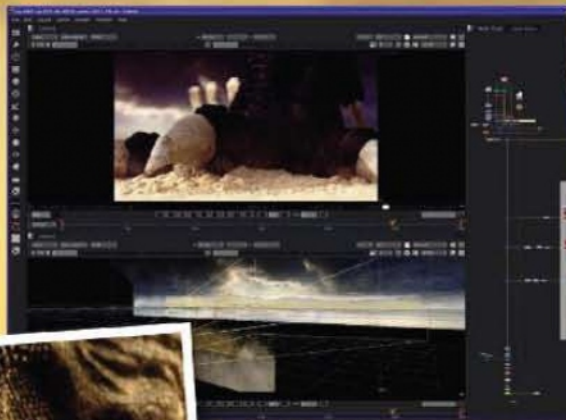
Lock down the story early on

"It's best to make changes in storyboard if you can," says Jellyfish Pictures' Phil Dobree. "Next best is the storyboard animatic; after that, pre-viz. The further down the line you go, the more expensive a change of story is."

02

Set up a visual template

Many studios we spoke to establish a visual template for a shot before starting work. In the case of Darkside, a key concept image defines lighting and textures; at Zoic, a lead artist does foundation work on a shot.



Planet Dinosaur images courtesy BBC / Jellyfish Pictures

provider for the broadcaster's upcoming eight-part science-fiction series Outsiders, due to air in January. For the show, the studio is using LightWave 3D – its primary workhorse for many TV jobs due to the speed at which it can pump out shots.

"LightWave has super throughput for certain things, like basic rendering and set extensions – it chews that stuff up," says Bishop. "Maya is excellent, and capable of a lot of things, but [we feel] Softimage is more capable of throughput in more areas, so that's the route we've gone down for our secondary package."

The need to use whatever tool gets the job done quickest is particularly acute if, like Jellyfish Pictures, you have to deliver over 3,000 VFX shots for a single job. The studio is currently working on the BBC's Planet Dinosaur, a six-part natural history series produced by the same department as 1999's landmark Walking With Dinosaurs.

"We tend to go off-the-shelf as much as we can,"

says the studio's founder and creative director, Phil Dobree. "We haven't got time to write a whole new particle simulator for a job [unlike film work]."

Nevertheless, broadcast studios do develop their own tools – or rather, tools within tools – all the time, tailoring standard packages to the needs of individual jobs, a task made easier by platform-agnostic scripting languages such as Python, and visual programming systems such as Softimage's ICE.

"It's much easier to do tool development quickly now," says Dobree. "We create scripts all the time, particularly [rigging and] animation systems, and quick ways to bake out animation and lighting."

MANAGING COMPLEXITY

The difference in tools, team sizes and timescales between movie and broadcast work is also reflected in the mindset needed for the job. Whereas film artists work on a large number of iterations of a small number of shots – one animator we heard of had



For the BBC's *Merlin*, The Mill's team of 70 had just two to four weeks from turnover to delivery of each episode, despite technical challenges such as the skeleton Prince Arthur Pendragon battles, and the all-CG manticore (pictured here with performance capture actor Eddie Marsan). Along with large 3D simulations, photorealistic humanlike creatures remain one of the biggest challenges to accommodate within the timescale and budget of broadcast work.

done more than 300 for a single shot in 10,000BC – in TV, the balance is reversed.

"In film, you may be doing one to four seconds of animation a week," says Dobree. "With [Planet Dinosaur], we know that each animator needs to do at least four seconds of work a day for us to deliver on time."

For Jellyfish, the key to success is getting creative decisions right early in production. "It's important not to skimp on planning," says Dobree. "If the storyboards are good, pre-viz is easier. If pre-viz is good, animation is easier. And if animation is good,

with an inexperienced production company, it does illustrate a guiding principle of TV effects: it's better to invest more time in the early stages of production than be forced to make dramatic changes later on.

While the supervisors we spoke to had varying opinions on where economies of time will be least visible in the quality of the finished effects (you can read their tips for increasing throughput – which range from the use of 2.5D for environments and effects to streamlining lighting set-ups – along the foot of this article), everyone agreed that in practice, what tends to be sacrificed are the final rounds of

“The lovely thing about television is it forces people making it to be economic with what you see on screen. Everything has to be done from such a creative angle”
Will Cohen, group head of TV and film, The Mill

lighting isn't as crucial. It all has a knock-on effect."

For a project like *Planet Dinosaur* – which Dobree describes as documentary informed by the narrative techniques of drama ("The style of the edit is very much like *The Bourne Ultimatum*") – this means getting involved with editorial decisions much earlier, and much more directly. Whereas movie production companies tend to use external overall VFX supervisors, distancing the director from the effects, Dobree insisted on the BBC team working in-house with its artists, enabling Jellyfish to receive feedback and shot sign-off far more quickly.

While this is by no means a rule of thumb in broadcast, particularly when a studio is working

polishing and tweaking which are generally standard in movie effects work.

"A common example is relighting," says Will Cohen, group head of TV and film at The Mill. "You probably have a single day to shoot a [TV] sequence, so if it happens to be raining on location, and then the sun comes out, those are the plates you're given."

"So at some point in the grade – which is done after you've finished the effects, because it's very difficult to get anybody to pre-grade anything – some of your work is going to fall apart when the contrast is pushed. Ideally, you'd go back, relight, and re-compose, but in broadcast, there isn't always that luxury."



Think movement: good animation and compositing are crucial to 'sell' shots on TV – perhaps even more so than when working with film

03 Exploit matte painting

Mattes provide a faster alternative to full 3D environments. Make them larger than you think you need to leave room for changes. Jellyfish Pictures creates a large overall matte for a sequence, then a set of smaller, related mattes for individual shots.

04 Use library elements

If you haven't time for a full 3D simulation, use 2D sims or practical elements projected onto cards within a scene. Practical elements can be reused: for *Primeval*, *Framestore* used dust hits recorded for *Walking With Dinosaurs* years earlier.

05 Use stock assets

Don't turn your nose up at sites like *TurboSquid*; Zoic uses its hard surface models extensively. But be prepared to rework details – on cars, remodelling the fine internal geometry of head- and tail-lights is often crucial.



■ The fungus monster from *Primeval*, one of Framestore's key VFX challenges from the show



■ Framestore minimised the monster's screen time to build tension

“On *Primeval*, we delivered over 1,000 shots in a series on around a tenth of a movie budget. In TV, there is an inverse relationship between ambition and funding”
Christian Manz, VFX supervisor, Framestore

However, this does open up the possibility of building long-term relationships with clients, particularly when several series of a show are done by the same effects house. According to Cohen, “One of the beautiful things about TV is that you form long-lasting collaborations with people you trust.”

PERKS OF THE JOB

A case in point is *Doctor Who*, the show that formed the genesis of The Mill's current TV department, and for which the studio is now working on its sixth series. “Even in the early days, it was very easy,” says Cohen. “There was one show-runner, and you could pick up the phone to them at the end of a series and discuss what they were working on for the next one a year ahead.”

Despite the difficulties of production, this opportunity for creative collaboration is what ultimately makes broadcast effects work so rewarding, and that's something that filters down to the rank and file.

“Unless you're at the top end of the food chain, everything in film is more rigid, more locked-down,” says Framestore's Christian Manz. “Artists are doing tons more iterations [to a director's own specifications]. In TV, you're turning around shots much more quickly, so a lot of the artists' own ideas stay in there.”

Throw in the fact that TV projects are typically screened within weeks, if not days, of delivery – meaning that shots can be included on demo reels much sooner after completion – and broadcast

This can sometimes make shot review a delicate process; clients, understandably, often focus on the shot in front of them, forgetting the constraints imposed on its production, and indeed, many of the studios we interviewed spoke about the process of broadcast production as being one of education.

“In film, there are a lot of very experienced people who are very visually literate,” says Cohen. “In television, because there aren't that many shows that have recourse to visual effects, more guidance is needed.”

06 Limit camera moves

It isn't necessary to insist the camera is locked off in each shot; steady tracks and pans are fine, and even handheld footage can be manageable. But try to avoid large sweeping moves, particularly those with changes of scale.

07 Know when *not* to economise

Pipelines don't differ that much from TV to film; you just get less time for each stage. But given that effects are often only seen briefly and in motion, bad animation and compositing often show up more than the fine details of the scene.

08 Scale down your lighting

Subtleties of lighting aren't as visible on TV as they are on a big screen. For broadcast work, *Darkside* drops LightWave's Ray Recursion Limit from 16 to 4, radiosity bounces from 4 to 2, and calculates radiosity cache every 10 frames, not 4.



■ The Mill has handled every series of Doctor Who since its 'reboot' in 2005



■ On the fast track: junior artists on Primeval worked on shots that would have been given only to seniors on Framestore's movie projects

Pay, hours and prospects

MOVIES ARE GLAMOROUS – BUT YOUR CAREER PROSPECTS ARE PROBABLY BETTER IN BROADCAST. HERE'S HOW THE TWO SECTORS STACK UP

Movie work may be seen as the Blue Riband of the effects industry, but broadcast artists have the last laugh when it comes to working conditions, according to our interviewees. Rates of pay are equal to those of movie work (for a junior artist in the US, starting salaries of \$10-50K are typical; in the UK, £16-20K) or even marginally higher. More significantly, many larger studios use more junior artists in the broadcast department to keep overall costs down, creating a demand for new staff. Working hours are similar to those of movies, too, and crunch periods last weeks, not months, without descending to the 24-hour days common in commercials.

Job security may also be marginally higher, particularly where an effects house has built up a long-term relationship with a production company and can predict the team size needed on future series accurately – although, as The Mill's Will Cohen cautions: "I don't think there's any [absolute] job security anywhere in the world. If you lose a job you thought you were going to get, you have to slim down."

But the real advantage of working in broadcast is the creative possibilities it offers, particularly for junior artists. "You learn more, and you get many more opportunities," says Jellyfish Pictures' Phil Dobree. "In film, you may have to do roto for three years and never get out of that department."

Finally, with team sizes so much smaller than in film effects, openings for senior-level work come up far more frequently. "The guys on Primeval would be comping stuff they'd never get near on a movie," says Framestore's Christian Manz. "A lot of people who did those shows have gone on to do amazing film stuff."



becomes a valuable way for junior artists to advance their careers (see the Pay, Hours and Prospects for some typical examples).

As the credit crunch tightens Hollywood budgets and timescales, the discipline imposed by TV work is becoming far more widely applicable. Far from being the poor relation of film work, broadcast is beginning to influence the way that movie effects are created.

"People looked at what we were doing on Primeval and thought, 'Flipping hell, you've managed to do that in how long?'" says Manz. "It's influenced our attitudes to budgets, how we view shots, how we get

■ The show's new 2010 titles, to coincide with the new Doctor, were created by Framestore in just two weeks from brief to air date

clients to watch shots in an edit."

Ultimately, TV work offers a mix of logistical challenges and creative opportunities that is unparalleled in any other field of effects. The budgets may be small, but the rewards are great; the lows are matched by corresponding highs. Or as Manz puts it: "It's stressful, and it's exhilarating, and in a couple of days, it's on TV." ■

09 Set up a comp template

Automate compositing as far as possible. Zoic sets up a master 'comp template' with all of the layers and layer relationships in place, then hands it to the artists to update individual render elements. The Mill uses a Nuke script.

10 Review shots on the fly

In film, it's common to review shots on loop to spot errors. In TV, this isn't pragmatic until the final checks. "Look at shots as the audience would, looking at the focus of the shot rather than the edges," advises Framestore's Christian Manz.

If all else fails...

No one we spoke to would admit to doing so, but as a last resort, doing effects work at a horizontal resolution of 1,280 – or even 960 – pixels, then scaling up to 1,920 in the composite, reduces render times and may not show up on TV.

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Insider story

Michael Wrightson, Director of Operations, Prime Focus, UK
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Why does Wrightson think 3D's become such a big deal? "It's the biggest leap forward in entertainment technology since the advent of colour film or surround sound," he says. "It delivers another dimension of immersion for the audience... we're in the middle of a genuine paradigm shift, and to me that is extremely exciting."



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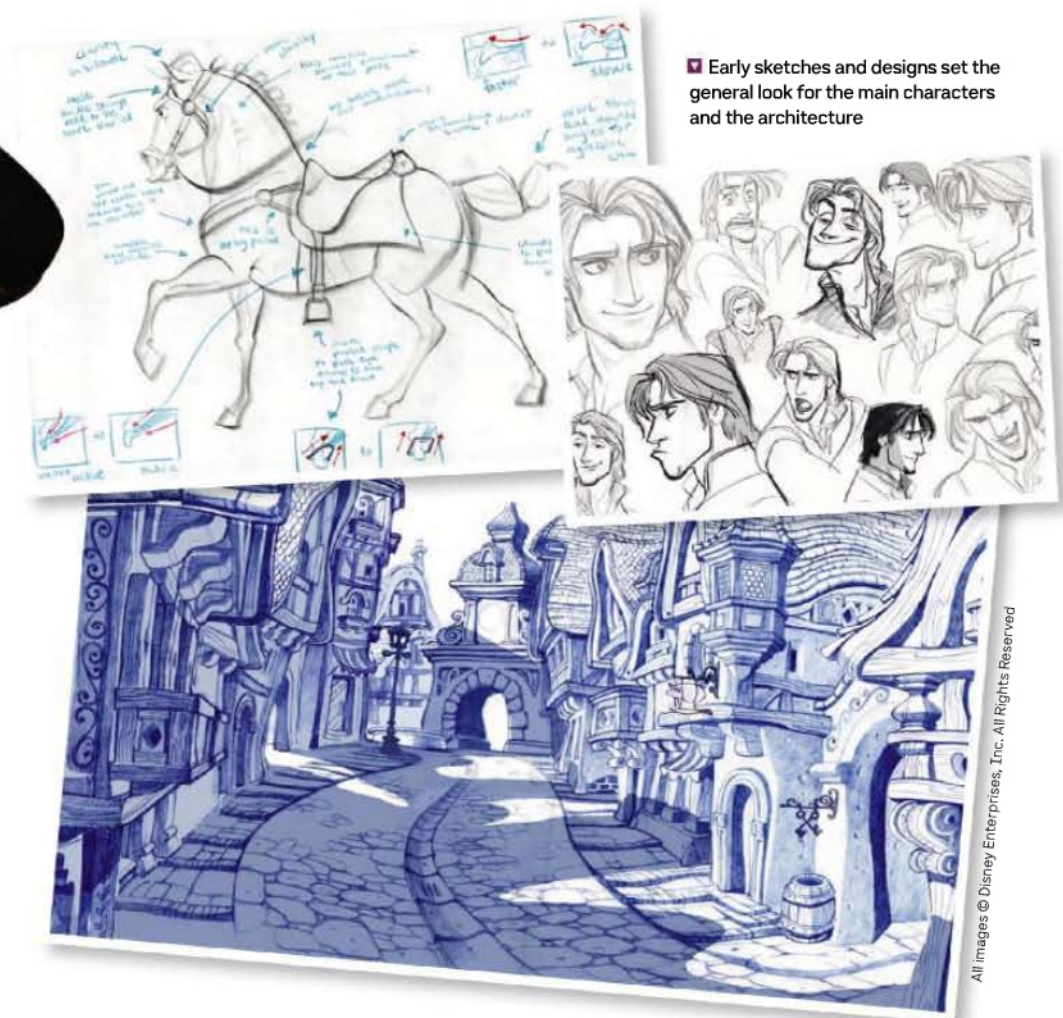


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Animation with a twist

In *Tangled*, Disney Feature Animation incorporates the best of the past with the best of the future, blending the look of traditional films with CG feature animation to create something unique, says **Barbara Robertson**



■ Early sketches and designs set the general look for the main characters and the architecture

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Tangled, Walt Disney Animation Studio's 50th feature film, accomplishes something no other studio has done – something, perhaps, no other studio could do: combine the look of the beloved Disney features from the 1940s and 50s with the attitude and action of a contemporary live-action film. Directed by Byron Howard, who received an Oscar nomination for Bolt, and Nathan Greno, head of story for Bolt, the film follows the Brothers Grimm's fairytale Rapunzel, but with a twist.

Rather than a prince it is a dashing rogue who provides Rapunzel's ticket out of her towering prison, the only home she's known – and rather than being the daughter of a thief, Rapunzel is a sassy modern princess. When this plucky heroine lets down her hair, she does more than drop her golden locks out the window as a ladder. She traps her thief, she opens doors, she coils it into a pillow.

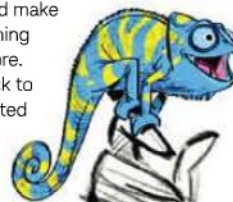
"Byron and I love the classic Disney movies," says Greno. "And it's exciting to be part of the history. We tried to take that look and make a CG movie that's something people haven't seen before. We didn't want to go back to the same wells – we wanted to do something fresh and different."

To design the style and give it that look, however, art director Dave Goetz and co-art director Dan Cooper did dip into the well. "The directors were taken with the early Disney

movies, Cinderella in particular," says Goetz. "For some reason those classic films have a graceful, appealing look. So we tried to dissect it and see what that was all about. Some of it was from the shapes, some was colour."

Old style

The shapes, they discovered, seemed to be combinations and re-combinations of S-curves and French curves. "When you look at old movies, you



■ Tangled: where the hair is the star as much as the lead characters





■ Disney's concept art covers a wide range of styles – but is all of an enviable quality



can see that they're consistent about using these shapes to compose with," Goetz says. "That gives the shows a visual continuity, a grace and flow. So, we tried to leverage off that."

Not an easy feat with CG objects, which aren't as malleable as drawings. "The directors were interested in making Tangled feel like a three-dimensional version of a 2D movie," Goetz says. Sometimes the technology cooperated – and sometimes it didn't.

One piece of technology that did work was a tree-building tool, which enabled Rapunzel and Flynn Rider, the thief, to run through a believable forest. In previous films, Goetz explains, the artists typically worked with three or four trees rotated to create a forest of apparently dissimilar plants. This time, they had a tree bank with approximately 30 trees.

"We couldn't see what the canopy looked like before we rendered the scene," Goetz says. "When you're fine tuning with S-curves, you're not really sure what you'll get. Fortunately it was all very credible."

For modelling, Disney artists used Maya, and for textures it was Ptex, the texture painting tool developed at Disney. "Ptex gives us per-face textures

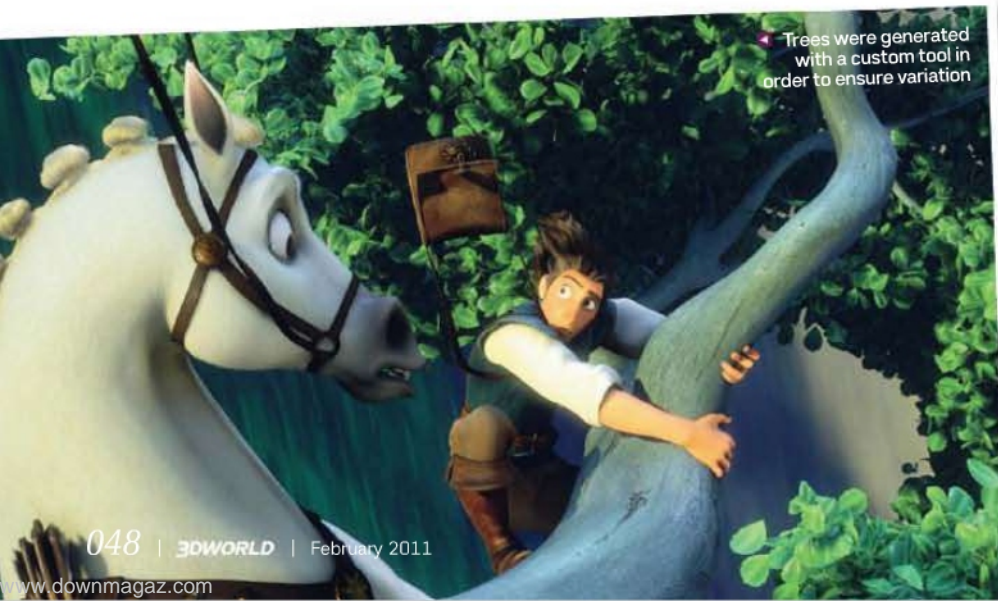
that you paint directly on subdivision surfaces," says look and lighting director Mohit Kallianpur. "Before, we'd cut our subdivision surfaces into many tiles, each with its own texture. With Ptex, we didn't have to cut up the surfaces, so it vastly reduced the number of texture files on disk – and it follows whatever happens with the mesh. We used it for everything on the show."

In addition to establishing shape and scale, Goetz, Cooper and the visual development department created an art packet that showed textures and colours for every element of the environment in the film. Look artists then created the elements based on the references in the packet.

"Although the shapes are somewhat stylised, the textures are pretty much photoreal," Cooper says.

“In the 20 years I've been at Disney, I've never worked on a show where every department plussed the show beyond anything any studio has ever done. It's one of the best CG films ever”

Dan Cooper, co-art director, Tangled



"Dave and I have a painterly style, so we would paint the effect of what we wanted and then provide a sample of the actual texture. The artists would have to extrapolate, approximate what we were going for."

Kallianpur calls it "real, but not photoreal. We took liberties with shapes, but not so much with textures. The world was a realistic world, so wood needed to look like wood and grass like grass."

Painterly palette

As for colour, Cooper describes it as somewhere between classic fairy tale and impressionism, with traditional Disney thrown in. "It's a hybrid of everything the directors liked and some things Dave [Goetz] and I liked," he says, shyly acknowledging that he has exhibited his oil paintings in galleries. "We both also paint outside of Disney for some sort of creative outlet... or maybe creative torture. Nothing worthwhile ever comes easy."

► Each lantern uses a 10,000-point cloud, and in one shot 46,000 lanterns are on show, employing 460 million light sources

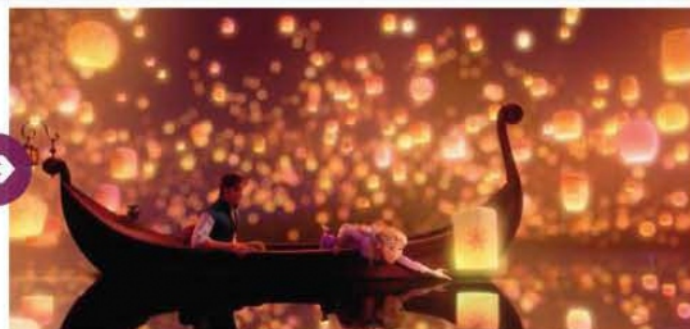
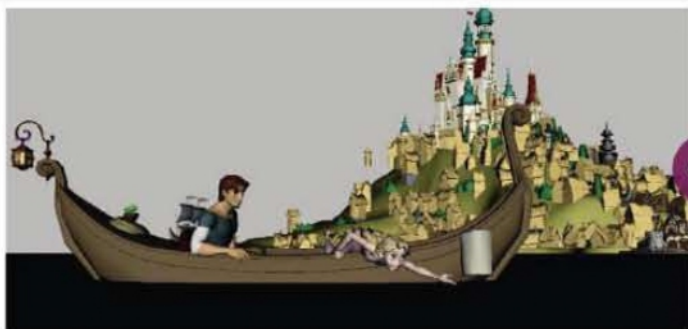


The light fantastic

A COMBINATION OF LIGHTING TECHNIQUES HELPED WITH ONE OF THE FILM'S MOST MEMORABLE SEQUENCES

One of the most beautiful shots takes place during a sequence with tens of thousands of lanterns. Throughout the film, the Disney artists used point clouds in Pixar's RenderMan to create the effect of light bouncing around the environment and to do occlusion. "You could use point clouds to do subsurface scattering, but we used ray tracing," Mohit Kallianpur says. "However, to light the characters with light from the lanterns, we used point clouds, which we received from the effects department as light sources. We put the characters in a cloud of lanterns."

In the effects department, the CG supervisors converted the light from each lantern flame into a point cloud that they baked per frame if the light moved. "What you want is the flickering of the flame, so if the shot was 50 frames, they gave us a 50-frame point cloud," Kallianpur says. "The lighting tool reads those point clouds and lights any of the objects in the scene with it. It doesn't have to be lanterns. A fireplace inside the tower or candles in the pub could all give us point clouds that represent that light. We bring in the point clouds, attach them to a light, and use the point cloud to light the objects. It's something we have done before, but never on as large a scale as with the lanterns."



Thus, as might be imagined, Goetz and Cooper weighed in heavily in the areas of colour and lighting, developing a colour script that described the palette for the whole movie. "We created thumbnail versions of each sequence that showed what time of day it was, the mood, and how we affected that with colour and lighting," Goetz says. These were paintings arranged in a grid pattern on a single printed sheet to show the colour scheme for each sequence.

"Then as we got into the lighting process," Goetz says, "we'd do paintings for key scenes that expanded the little postage stamps on the colour script. The colour keys show direction, hue and saturation, intensity of key and fill lights, amount of atmosphere, and any other information we would like an artist to have," Kallianpur says. During the production process, the art, look and lighting directors sometimes did quick paintings on top of a shot being lit to illustrate particular ideas.

Goetz notes that traditional 2D movies have rich colour, which they adopted for Tangled. "One of the things we were going for with Rapunzel is the whole symbolism of the hair," he says. "She's a bright

character with a positive attitude and has a positive effect on everything, so in the beginning, when we meet her, there are a series of warm sequences. Part of that is to set up the appeal of the world and part is a reflection of who she is as a character."

Beauty lighting

When we see Rapunzel, we see sunlight and bright, saturated colours. When she is in the tower, it is warm and cosy; when she leaves, it is grey and lonely.

On the other hand, Mother Gothel – the witch who imprisons Rapunzel – wears a blood-red dress and has jet-black hair. Cooper describes her as pale but healthy: "She has a dark cloak with a touch of green to it, so we have that red-green vibration going, but mostly we see black," he says.

When she enters the empty tower looking for Rapunzel, she doesn't add a bit of warmth to the scene – and later, when she murders a character in the film, the colour again disappears. "We de-saturated the entire scene," Goetz says. "It's beautiful, but we have a dead, gray feeling in the palette. It sticks to her because she's so evil." ►►

■ The rough animation stage (left) is very much a no-frills setup. The final scene (right) shows how much is added with textures, shaders, lighting and effects

■ Maximus the horse is more cream-coloured than pure white, to provide a warmer look to the film – an aesthetic that applies across the board



■ The making of Tangled



While Mother Gothel has cold, grey lighting, Flynn wears earth and sky colours. "We gave him a cream-coloured shirt, blue jerkin, and earth-toned pants," Cooper says. "We wanted him to be more or less an adventurer type."

The horse, which many think steals the show with his canine-like antics, is also not quite white. "Most of the whites in the film are cream-coloured," Cooper says. "If something is white, it leans toward buff, eggshell or off-white. Our marching order was that everything had to have appeal, that we had an underlying warmth in all scenes in the film. We made certain we had saturated colours except when the story dictated that something needed to be grey or contrasty or tense."

To convey the lighting they had in mind which would produce the colours and mood of the classic Disney films, Goetz and Cooper again created impressionistic lighting keys. "We tried to get a feeling of impressionist light," Cooper says, "which is a combination of ambient from the sky, sunlight, and the warm light from the ground. Hopefully, we conveyed that in every scene. In the paintings Dave and I do, lighting isn't the standard razor-sharp CG. It has more atmospheric edges."

Atmospheric edges? "It's basically getting the light to wrap around a surface," Cooper explains. "You

get the environment interacting more with the edges of the object rather than lighting something that feels like a precious piece of Tupperware under light. We also used indirect lighting."

When shadows appear, they are either on the opposite sides of the colour wheel from the light or near the colour. "It depends on the emotion you want

■ Baddies Hook Hand and Vladimir, with their band of thugs, harass our hero Flynn – but not for long

■ Flynn is subjected to some of the most horrible torture known to man or cartoon character: mime



to convey," Cooper says. "If you have the shadow and light across from each other on the colour wheel, it gives you a bright and cheery feeling. If they're closer in hue, more monochromatic, it can feel sombre. We use [a monochrome scheme] for sensitive scenes or sad or tense shots." Typically, each shot has one dominant colour and the other

“For some reason those classic Disney films have a graceful, appealing look. So we tried to dissect it and see what that was all about... some of it was from the shapes, some was colour”

Dave Goetz, art director, Tangled



■ Strong contrast and dynamism guided every lighting set-up

subordinate: for example, a cool light with warm shadows, or vice versa.

Cooper and Goetz split the lighting keys between them, creating hundreds for the film. Lighting ranges from daylight to night, interior to exterior, cloudy to sunny – and sets the mood, sometimes even despite available light.

The tower, for example, needed to feel warm, inviting, and charming most of the time, even though it had only a few windows. "We cheated the heck out of it," Kallianpur says. "To make the lighting look different in various sequences and convey moods, we made up windows that did not exist. The bar was high on this film."

Guiding light

One of the most important roles for lighting is to direct the audience's eyes where the director wants them to look and that was, most often, at a character. "All of our lighting relies on the rule that in the first one to two seconds, you should be able to tell where you're supposed to look, and everything else fades

A small world after all

TANGLED PURPOSELY TAKES PLACE IN AN INTIMATE SETTING

When designing shots and sequences, the film's art directors often used trees and hills to cut off the horizon and create a small world, one someone could cover in a day or two.

"We have very few scenes where you could look out over a huge vista," Dave Goetz says. "It's not a David Lean movie where the landscape is a character." He explains that one of the directors' touchstones was Pinocchio, much of which takes place in the puppet's village where the buildings have a short, squat sense of proportion.

Thus, the town in Tangled, even though it is the seat of the kingdom, is more like a village. "Scaling everything so it wasn't too grand was one of the keys to the appeal," Goetz says. "The town was a place you'd want to go to and if you did, it would be charming and you'd have a good time. If it were imposing, you'd get a different feeling."

Even though the architecture is European and somewhat medieval, the artists wanted to design non-specific styles, in much the same way as the buildings in Disneyland were designed. In fact, Disneyland inspired the directors. "So, we took pictures of everything [in Disneyland]," Goetz says. "But, of course, Disneyland is inspired by European buildings, so we kind of went shopping. Production designer Doug Rogers is a walking encyclopedia and can tell you which buildings are from Germany, Poland, Portugal, wherever.

"But in the long run, we were really just aiming for that charm and appeal. Even when we literally used a building from somewhere else, we souped up the shapes and proportions to make it feel charming."

■ Tangled's architecture is a 'charming' mixture of European, medieval and Disneyland

into the background," Cooper says. "Sometimes it's through focus, sometimes it's with a pool of light, and sometimes through contrast."

Again drawing from the early Disney films, the artists designed the same kinds of theatrical lighting. "In the old Disney films, you'll see dark shapes over light or light shapes over dark," Kallianpur says. "If the characters are lit, we make the background darker – or we give the characters a rim light to outline them against the background."

No matter what the lighting conditions, Rapunzel never has harsh shadows on her. "It wouldn't be appealing," Kallianpur says. "We wanted more diffuse lighting, so we filled her with warm bounce from the environment." When a grassy environment bounced green light, they minimised the reflection to keep her beautiful, warm and charming. Similarly, they never let her shadows go gray. "A lot of times in CG when you're lighting in low light, the shadows areas tend to go to a neutral gray," Kallianpur says. "We always had some hue in the shadow. If we had a warm light, we made the shadow cooler. If a cool light, we made the shadow warmer."



■ Tangled's artists relied on traditional techniques of colour and contrast to draw the eye and focus attention

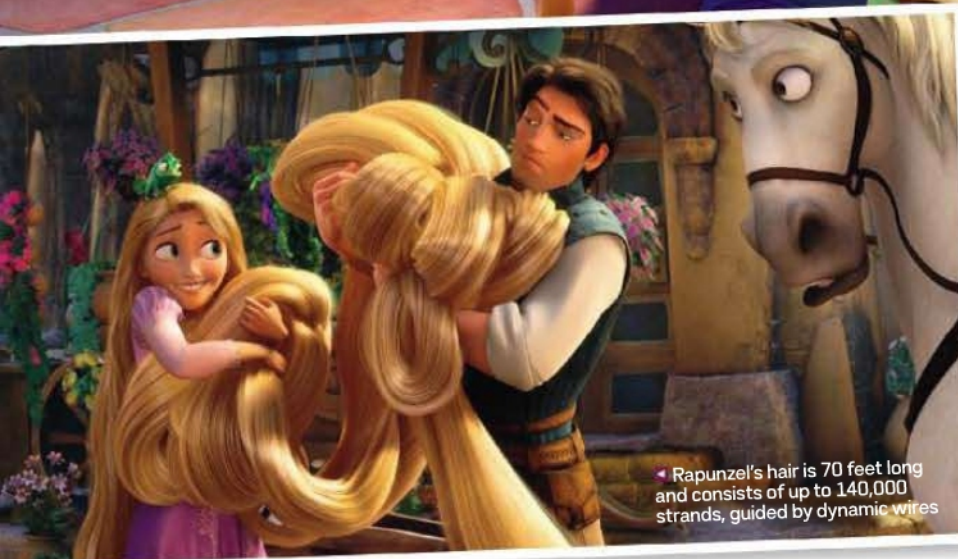
To colour and light her hair, the team wrote a new hair shader using a physically-based algorithm. "We discovered that blond hair has particular highlights and glints that are unique," Kallianpur says. The new shader, which works through RenderMan, adds 'glint' to the primary and secondary highlights.

"You almost want to shade hair as a volume," Kallianpur says. "We create deep shadows, you get that depth information. You know how far light can pass through the hair and scatter around. It's more realistic." The effects team, however, added the magical glow as a separate element.

Rendering Rapunzel's 70 feet of hair required special techniques. Typically, hair grooming, »



◀ ▶ This sequence shows the progression from rough animation to hair simulation to hair and cloth render to final colour output



◀ Rapunzel's hair is 70 feet long and consists of up to 140,000 strands, guided by dynamic wires

simulation, shading and lighting teams think of hair as a collection of very thin cylinders, which works well for short hair. But Rapunzel's hair was so long and so animated, one piece of geometry wasn't enough. Instead, the technical directors wrote software that dealt with the problem in an unusual way.

"In some shots she's done something with one part of her hair and something else with another

part, so they split it and then faked it to seem like it was one piece of geometry," Kallianpur says. "From that they could get point clouds and do occlusion. They faked the normal so it looked like one big piece of hair, but it's made of individual cylinders."

To create and move the hair, Disney used an in-house simulation system, a variation of a typical guide-hair-driven simulation system, but one that uses something called dynamic wires, created by

Kelly Ward, to control the 70 feet of hair and give animators a useful preview. Some shots called for the team to render 140,000 individual strands, a number that would have been impossible to simulate. Instead, the system started with 173 guide hairs in lengths appropriate for the shot, even full length if necessary. Riggers placed the guide hairs and gave each approximately 40 controls; however animators and hair TDs could add or subtract controls as needed. The animators and hair TDs put the tubes into an initial pose, the TDs would run the simulation and see how it performed, then tweak it using various constraints and parameters.

In shots where Rapunzel does something specific with her hair, animators might start the shot by animating one guide hair and then a cluster would follow. "We could blend between animation and simulation," says Jesus Canal, CG supervisor, "and specify what percentage follows simulation and what follows animation." The 173 guide

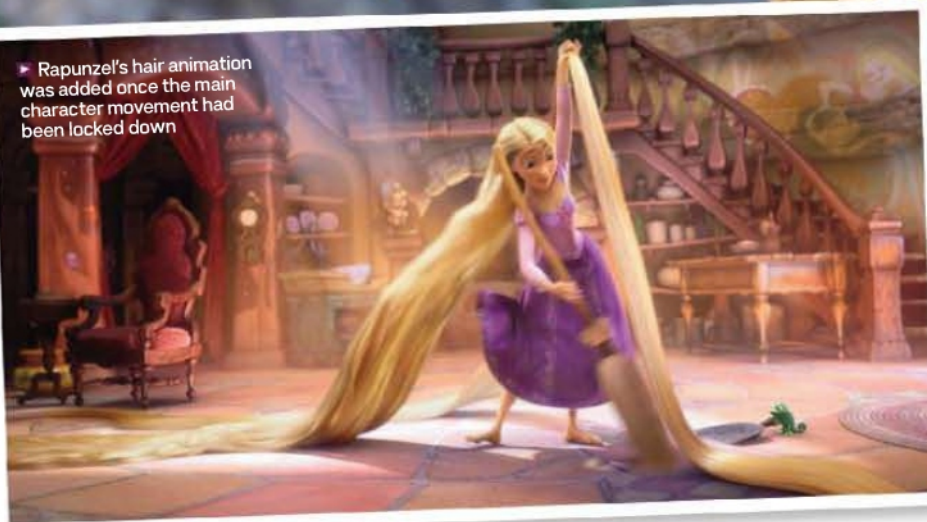
A different cloth

COMPARED TO HAIR, CLOTH WAS EASY

When Rapunzel's hair collided with her skirt, usually the team would simulate the hair first and then use it as a volume for simulating the skirt. For cloth simulation, the team upgraded the system built for Bolt. "The cloth system, which like the hair system was under Canal's purview, was also written in house," says Steve Goldberg. "It allowed us to do quite a few interesting things. At one point, Rapunzel has a flag balled up in her hand. She opens her hand and the flag uncrumples itself. We were excited the cloth engine could handle that so well."



► Rapunzel's hair animation was added once the main character movement had been locked down



“What the directors wanted was that when Rapunzel was in the tower and happy and joyful, there was a lot of warm bounce everywhere, so we used a lot of point clouds to give us that effect”
Mohit Kallianpur, look and lighting director, Tangled

hairs were then multiplied into 140,000 individual strands – fewer for some shots – in rendering, using parameters set by look and lighting artists.

In one shot, Rapunzel and Flynn are underwater. To simulate the water, Disney used PhysBAM libraries integrated into the CG pipeline. To move her hair inside the volume, they put the the guide hairs through a flowfield and ran the 3D simulation. "We'd do an initial pose and then let the simulation run – and that was true whether she was in the water or in the tower," says Steve Goldberg, visual effects supervisor. "Getting that pose was half the battle. The hair had to be in the right place from shot to shot to provide continuity. We had aesthetic guidelines from Glenn Keane, our primary character designer, who said the hair shouldn't just lie on the ground. There

was a twist to it, a volume he wanted to keep."

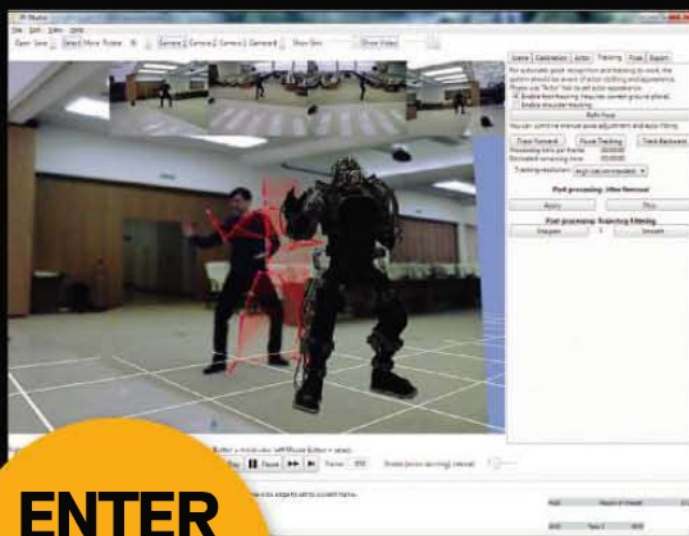
Real, but not photoreal. CG humans with the subtlety of those in classic, hand-drawn Disney films. A three-dimensional film with the look of 2D. Shape, texture and colour all played their parts well. And no one is more excited about the result than the people who have been at Disney for many years.

"This is not the same old shit," Cooper says. "It's just not. I've worked on a lot of gorgeous films, but I think this is the best film we've done in the last 20 years... possibly more." ■

Tangled premieres on 28 January in the UK, and is showing now in the US.



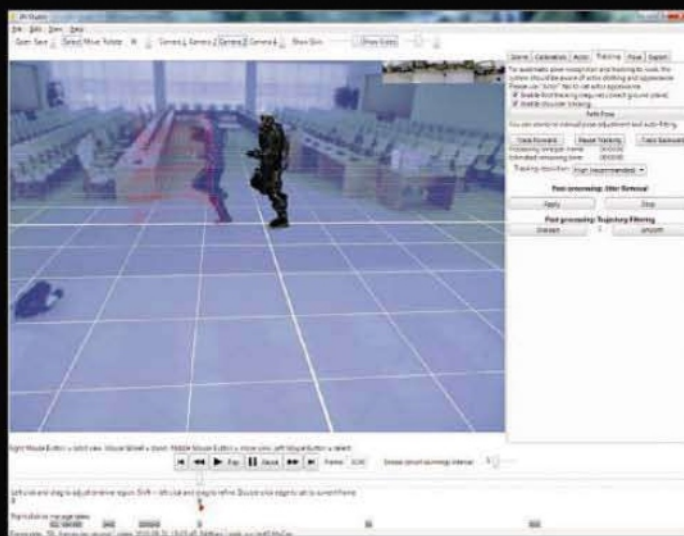
► The Brothers Grimm tale of Rapunzel is based on Persinette, a French fairy tale from 1698



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To enter, visit www.ipisoft.com/3dwcomp and download a 30-day free trial of the software. Use the software to produce an original 3D animation, and email the animation to 3dwcomp@ipisoft.com.

Five animations will be chosen after the closing date of 7 April 2011 and their authors will be awarded a full license.

This issue we've teamed up with iPi Soft to give you the chance of winning one of five completely markerless motion capture systems – plus a year's maintenance – making for a combined prize total of \$4,975.

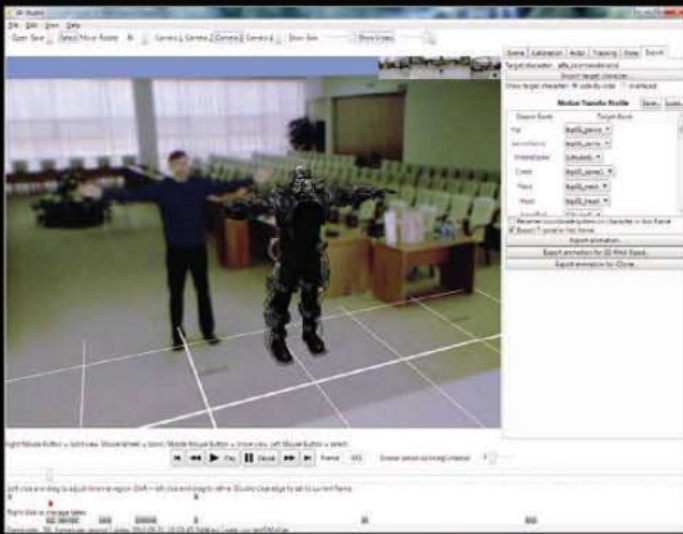
iPi Desktop Motion Capture Standard Edition is a markerless motion capture technology that, as the name implies, puts motion capture at the animator's desktop. Since it's markerless, actors don't need to wear special costumes with markers or sensors – your normal clothes are fine. You also don't need to worry about ensuring the background is uniform, or set up any special lighting.

All you need are three to six standard, inexpensive webcams to record video to your PC, in a capture space which can be up to 20 ft x 20 ft. An HD camera isn't necessary, as the system will happily work with image resolutions of 640 x 480 or 320 x 240. iPi Soft recommends the Sony PlayStation 3

Eye camera, which is cheap and widely available. The software then analyses and converts this to motion capture data, with processing typically taking one to ten seconds per frame, depending on your CPU and GPU speed. Converted data is exportable as BVH, Collada, 3ds Max Biped-compatible BVH or Valve's Source engine animation format SMD, with more formats being supported all the time.

Using integrated motion transfer, animations can instantly be re-targeted to custom rigs and skeletons. The system can be used together with many popular 3D applications, including 3ds Max, Maya, MotionBuilder, Poser, DAZ Studio and iClone.

Released in June 2010, this software is already used by several Hollywood studios, and many animation hobbyists. It runs on any reasonably modern PC with Windows XP, Vista or Windows 7, and requires a Direct3D 10-capable graphics card (with SM 4.0). ■



■ With integrated motion transfer, animations can be instantly re-targeted to custom rigs and skeletons, and tweaked by hand if necessary



■ Actors don't need to wear special costumes with markers or sensors



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3D WORLD

Next Issue

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Follow our expert advice to take your final image quality from good to great



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▣ Attila Csepy's robot is rendered using Maya and mental ray – see In Focus next issue



VFX in games Tips and techniques for making the most of visual effects in game level development



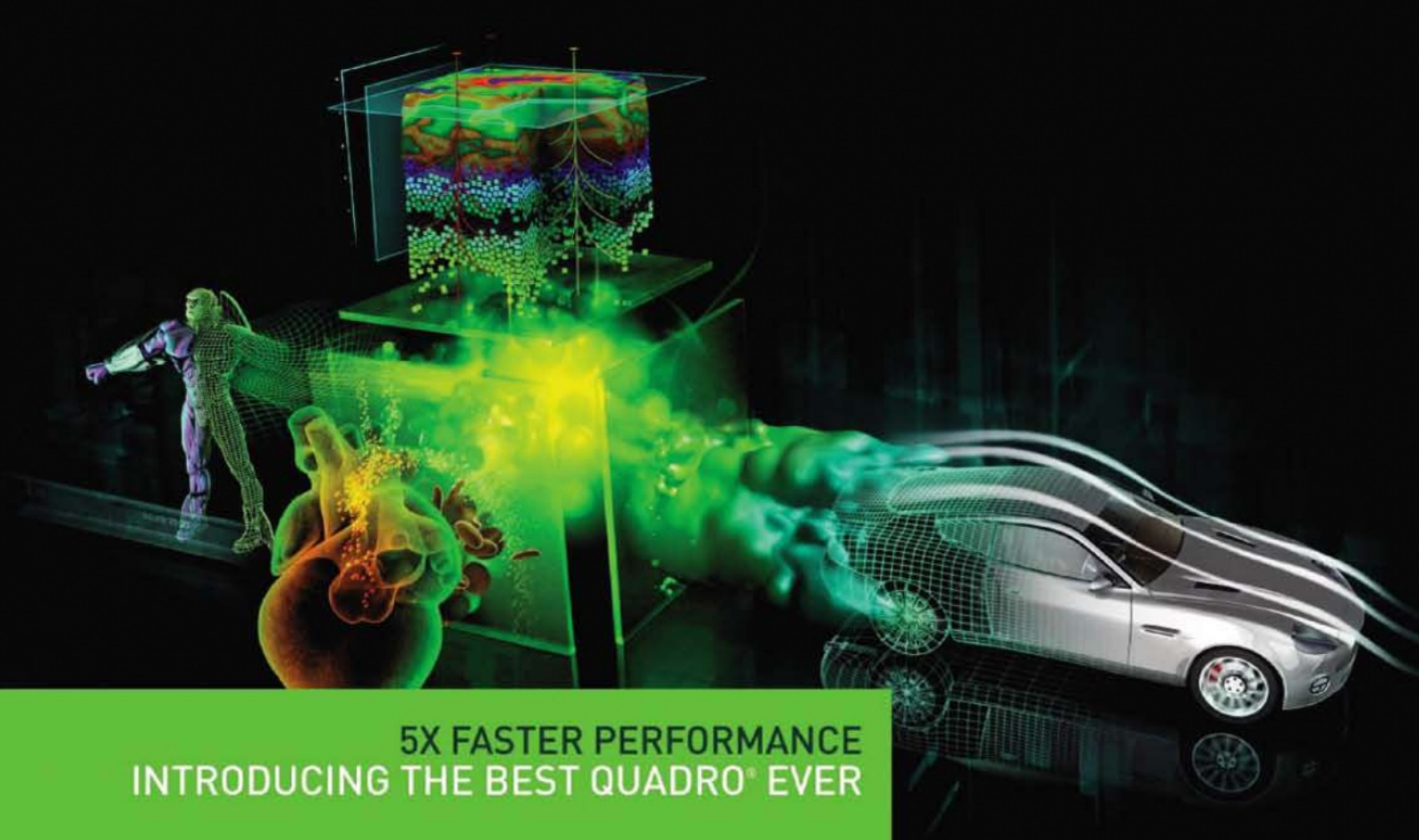
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Showcase

The month's best
new commercial
3D projects

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Projects

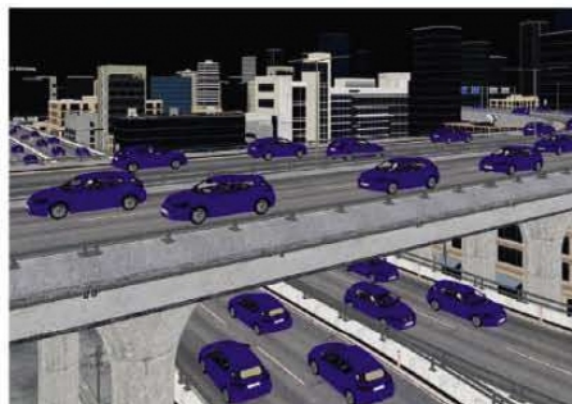
Our round-up of commercial print and short-form work this month includes the new Lexus, a splash of Coors, and Keith Urban

Project Lexus Hybrid Drive – The Quiet Revolution is Starting Studio Air CGI

Air CGI has completed a multi-purpose, fully CGI promotional image for the Lexus CT200H. Producing the advert from start to finish, the team modelled the environment, rendering multiple vehicles from client data, before final creative retouching.

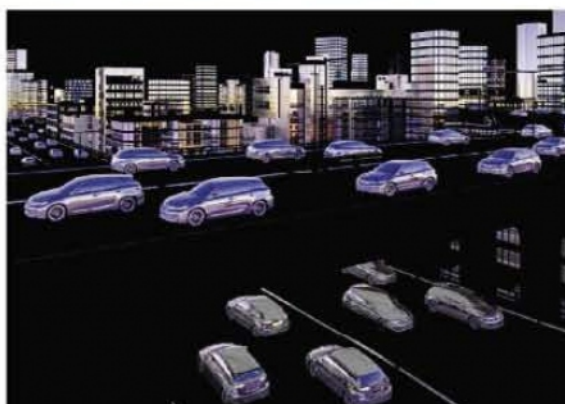
The studio used 3ds Max and V-Ray to construct and render the image and was challenged by a short deadline, which meant completing an image with a high level of detail and realism for high print resolution. "3ds Max allowed us to have an efficient workflow and manage very large data sets, while V-Ray also allowed us to render a very large scene effectively and render multiple passes to be used later in Photoshop," says production manager Gill Lucas.

aircgi.com

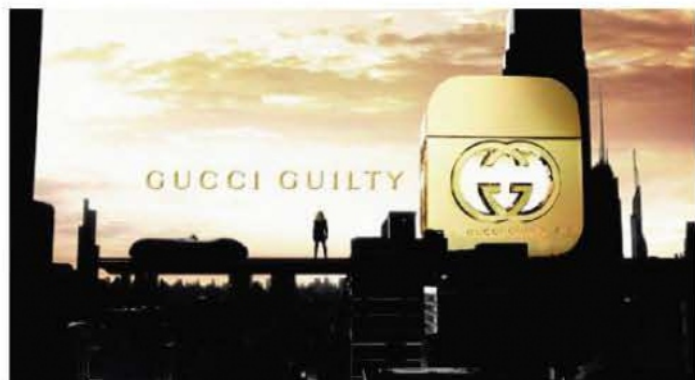
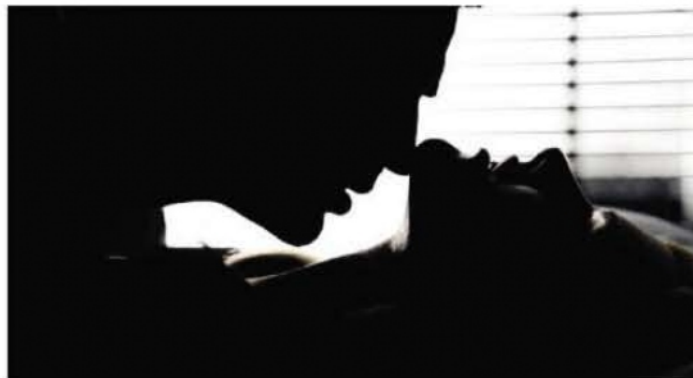




Photoshop enabled the studio to make use of all its render passes, and with masks it was able to manipulate and enhance the image to achieve desired results



■ The diffuse pass, raw lighting pass and reflection pass: three of the many passes involved in the final composition



Project: Gucci Guilty
Studio: REM Ruini e Mariotti

REM Ruini e Mariotti has finished a 3D campaign for new fragrance Gucci Guilty. The commercial, produced by Think Cattlea with RSA Films, is directed by legendary comic book artist Frank Miller and stars Evan Rachel Wood and Chris Evans.

The studio used Maya from the pre-viz stage right through to final renders. Shake was also used heavily for compositing. Stefania Agnello, PR officer at REM Ruini e Mariotti, explains the biggest challenges in creating the ambitious campaign: "Building an entire city and managing all the associated data within one program was essential, and quite a challenge – as was the generation of computer-generated fire."

rem-ruiniemariotti.com





■ **Project:** Coors 'Launch Aluminium Pint'

Studio: Framestore

This new spot for Coors was created by Framestore using a mix of live action, 2D matte painting, and 3D animation and effects.

The launch pad and bottle shuttle were both modelled and animated in CG from scratch using Maya and Houdini. They were then lit and rendered in mental ray using image-based lighting, the renders were composited in Nuke, and Flame used for final compositing and grade work. "Maya proved its worth in the early stages of the project when we needed to quickly create a rough layout of the 3D elements," says VFX supervisor Ben Fox.

"We had a group of 3D artists model, animate and render rough versions of each shot, allowing us to get feedback from the directors and clients early on," adds fellow VFX supervisor David Mellor.

framestore.com



“The plug-in allowed us to easily add and edit the racing physics to the cars while also attaching our own car rigs”
GARETH THATCHER, TECHNICAL EDITOR

■ Project: NASCAR The Game 2011

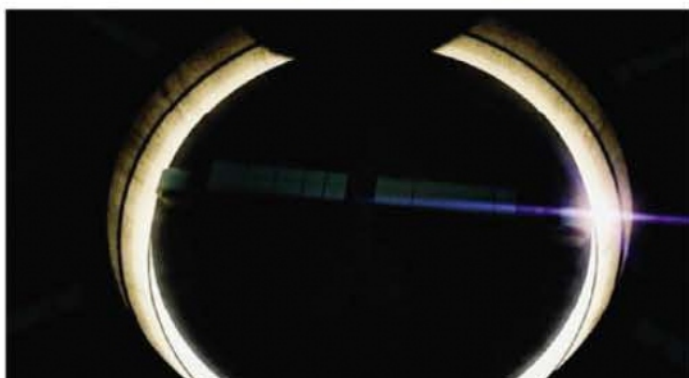
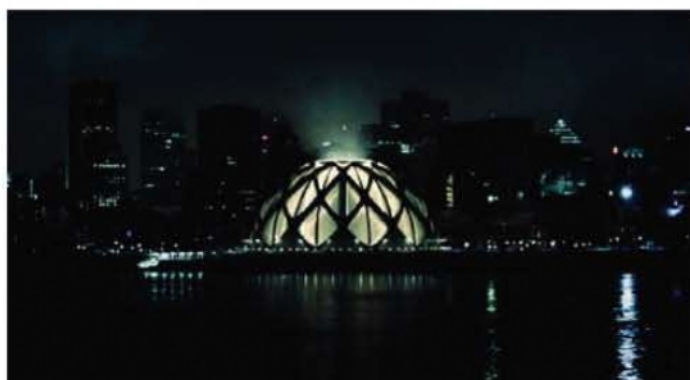
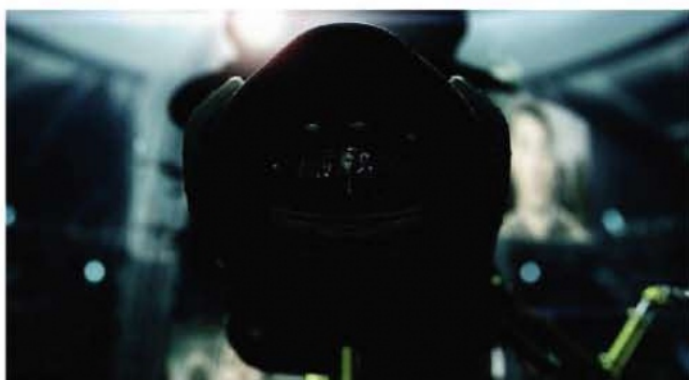
Studio: Mi

UK-based animation and VFX studio Mi created the trailer for the latest NASCAR games using 3ds Max and Maya, alongside the Craft Animation 4-Wheeler plug-in. Technical editor on the project Gareth Thatcher explains the significance of using the plug-in: “It gave us the flexibility to easily add and edit the racing physics to the cars while also attaching our own car rigs in both Max and Maya.”

The spot also features an impressive barrel roll sequence, achieved through Maya's rigid body dynamics and morph targets in Max. These effects were created with FumeFX together with 3ds Max's Particles.

wearemi.com





■ **Project:** Kodak 'Prosper'

Studio: Nathan Love

This 29-shot VFX-driven spot is a world away from recent Nathan Love projects, which include the cutesy animals in the recent Baskin Robbins commercials, and the cartoon characters of the Pop-Secret spots.

This project for Kodak was produced and supervised by Love, which created a dramatic CG world for live-action elements to live in. The studio used a varied pipeline consisting of Maya, ZBrush, Photoshop, After Effects, Nuke and Temerity's Pipeline for rendering and project management. "Pipeline was invaluable," says executive producer Mike Harry. "By organising the workflow, we were able to limit the times each shot was rendered. The shots were very render-intensive, so we were able to maximise our resources to allow enough time for compositing."

nathanlove.com



■ **Project Ford Mondeo**
Studio Recom

Recom created a CG environment for the studio-shot Ford Mondeo to sit within, and also produced the shots in which the cars become see-through. Using Maya, mental ray and Photoshop to complete the images, the studio rendered out many passes from Maya before working on the compositing to create the transparent images. "We had to create a car that was visible within but not overly technical in its appearance, but rather organic, maintaining its structure, depth and highlighting the integral features of the car," says CGI artist Richard Levene. recomfarmhouse.com



■ **Project: MTV The Supercharts**

Studio: Upper First

Upper First has created a massive, gelatinous and largely gross-looking pink blob for MTV. The studio started by creating a low-res version of the blob, simulated using Maya's nCloth. Pressure settings were used to keep the volume of the blob while it was moving. When the team were happy with the basic motion, it was cached and the simulation was then removed.

"The high-res version was then simulated with the cached blob as an attractor," says VFX production supervisor Sebastian Åkesson-Holm. "This gave us better interaction with the collision objects and other details." The six, ten-second spots were created in two and a half weeks.

upperfirst.com

“The final version was simulated with the cached blob”

SEBASTIAN ÅKESSON-HOLM





■ **Project:** Keith Urban,
Put You in a Song
Studio: Trunk

Trunk was commissioned by Treatment Studios to create animated visuals for Keith Urban's performance at this year's Country Music Awards in Nashville. Including a variety of 2D and 3D techniques including pixelation and stop-motion, the images largely consist of bright backgrounds with additional 3D elements on top. The images were completed using 3ds Max and After Effects.

Producer Richard Barnett explains the difficulties Trunk faced: "The really amazing aspect to this project is the amount we achieved in 13 days. The complexity and depth to some of the scenes and the amount of design needed to make it all fit with the track was a really good challenge."

superfad.com



**Submit
a project**

If you would like to see your studio's work featured in these pages, email us at the address below, including brief technical details and at least three print-resolution stills. Please note that we can only feature commercial projects released to the public within the last few months.
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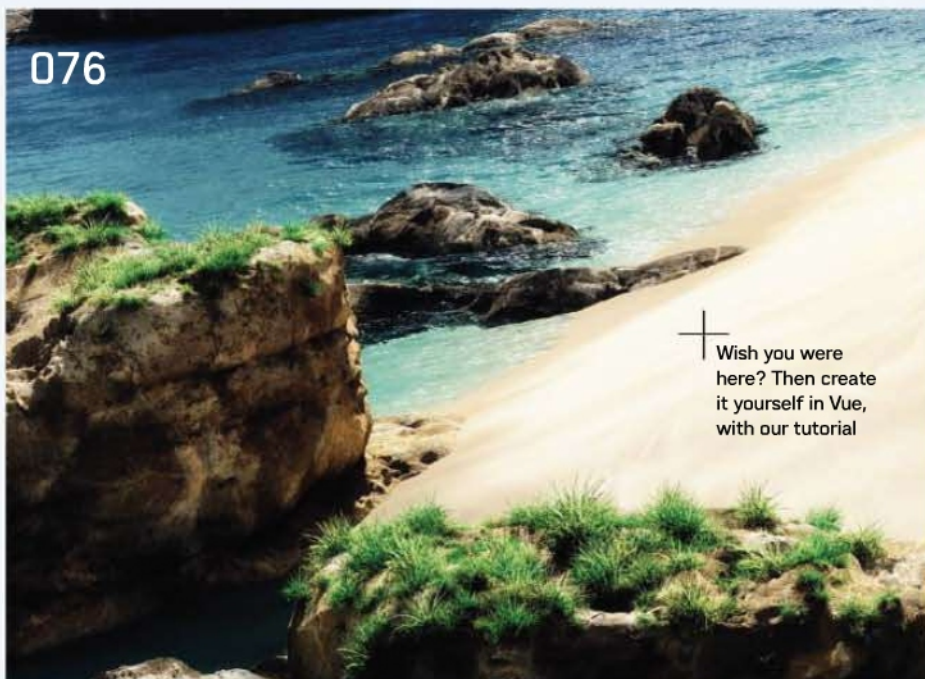
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ZBrush

Step-by-step
ZBrush
Sculpting

FOR
ZBrush 4.0

ALSO REQUIRED
Maya, Photoshop

TIME TAKEN
Four hours

TOPICS COVERED

- ZSphere base mesh generation
- ZBrush primitive modelling
- ZSketch
- Hard-surface brushes
- Creating geometry with ShadowBox
- BPR render passes



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Sculpt a biomech figure in ZBrush

Discover new tools and techniques as **Scott Spencer** shows you how to combine organic and hard-surface modelling to create this sci-fi sculpture



About the author

Scott Spencer is a digital sculptor and designer at the Weta Workshop in Wellington, New Zealand. Currently Scott is working on various film projects including Peter Jackson's *The Hobbit*. He is also the author of *ZBrush Digital Sculpting: Human Anatomy* and *ZBrush Character Creation*, recently published in its second edition scottspencer.com



Use ZBrush's advanced tools to create this biomech with Scott Spencer's expert guide

Includes
135 mins
of video
workflow

For this tutorial, I'll demonstrate a methodology for creating an intricate biomechanical character in ZBrush. I chose a biomech because it offers a perfect cross-section of organic and mechanical shapes to recreate. It also allows me to show how versatile the ZBrush modelling tools can be as we develop the character on the fly, adding parts gradually to build up to a completed character.

This approach will allow us to explore many of the new ZBrush 4 tools for both organic and hard-surface modeling. We'll look at the new Clip brushes for slicing planes into geometry as well as the Trim and Planar brushes. To create new geometry, we'll look at ZSpheres, ZSketch and the new ShadowBox tool. We will also use GoZ to combine Maya's

modelling tools with ZBrush to maximise our flexibility in creating the shapes we need.

You'll begin by working on a generic head model, changing its shape with the Clip brushes and standard sculpting tools. From there, you'll create the second major mass of the body: the torso. Here, we'll really start to look at hard-surface brushes like Trim Dynamic and Polish. Once the major forms are in place, you'll create some smaller mechanical details using ZBrush primitives and ShadowBox. Once we have completed the modelling phase we will then turn to the new BPR rendering engine in ZBrush 4. This rendering tool enables you to create accurate shadow and ambient occlusion passes, which can be exported to Photoshop for compositing a final image. »

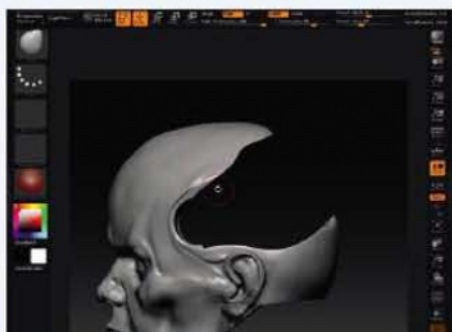


■ TRAINING Sculpting organic and hard surfaces



■ Video 1 00:00:05

Start with a generic head model to avoid starting from scratch. This model's provided with the scene files, or you can use your own



■ Video 2 00:00:12

Use the ClipCurve brush to carve out the back of the cranium, making it ready to accommodate mechanical parts later on



■ Video 2 00:12:52

The ClipCircle brush makes it straightforward to create circular sockets for tubes to link into

▶ Video 1 00:00:05

Rough in the head

Load the generic head object from the project files. Using the Move brush, shape the cranium into a larger, more bulbous shape. You want a larger cranium because you'll be carving out the back of the head and filling the skull with mechanical tubes and pistons. It also gives the character a strangely foetal quality which adds to its weirdness.

Using the Standard brush, sink in the cheekbones and accentuate the bone structure of the face. This takes the character away from a heroic, strong-jawed man and gets it looking more like what you'd expect of a more unsettling, sickly cyborg.

▶ Video 2 00:00:12

Slice the head

Because the head of this character will be suspended in the network of mechanical parts that keeps it alive, you want to trim the neck and shoulders away. Step down a few subdivision levels and use the Move brush to shift the geometry up toward the base of the skull.

Using the Brush palette, select ClipCurve. This is an active selection brush that enables you to draw a clipping curve and carve part of your form. [Shift]+[Ctrl]-click just outside the base of the skull, then along the division between the head and neck. Note that one side of the curve is feathered grey: anything on this side will be trimmed.

As you drag, you can tap [Alt] to introduce a curve or double-tap [Alt] to create a hard angle. The ClipCurve brush is actually a flattening effect, so be sure to avoid any geometry that extends out beyond the volume of the head. The same approach is used to carve out the back of the head.

▶ Video 2 00:12:52

Add details to the head

Select the ClipCircle brush. This brush differs from ClipCurve in that it draws a circular clipping area. Use the ClipCircle brush to add points on the head into which tubes will later insert.

Note the crosshair that appears: if the circle is drawn so the crosshair is outside the geometry, it will carve away a circular shape. If the crosshair is inside the geometry, it will create a countersunk cylinder shape. Obviously, then, it's important to double-check



■ Video 4 00:00:05

To create the base shape of the torso, append a PolySphere to the scene, then use the Move brush to rough out the form

where this crosshair is. Draw a circle and make sure the centre point is within the geometry to create a tube connector.

▶ Video 3 00:00:05

Create the torso

You'll now continue to the torso mass. Click LightBox in the toolbar and select the Tool tab. From here, select a PolySphere. This will load a PolySphere ZTool into the Tool menu; it will also swap the active ZTool for the sphere.

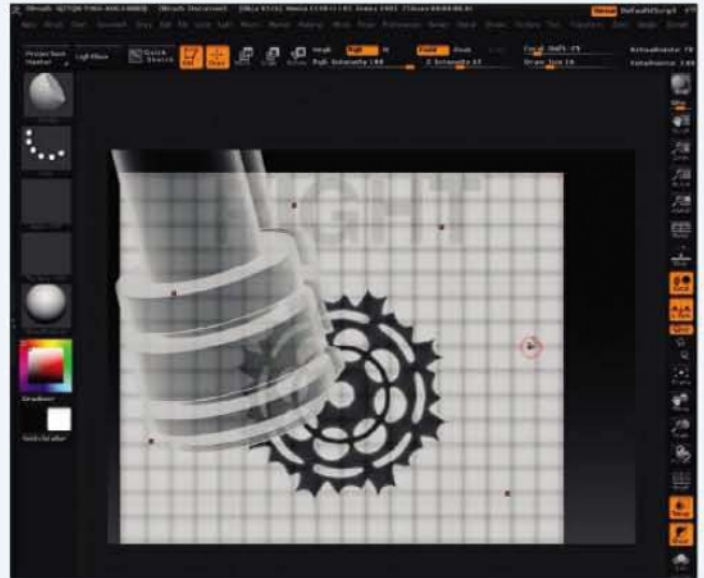
Return to the cyborg ZTool and append the PolySphere as a SubTool. This PolySphere will be the basis of the torso. Use the Move brush to shape it into the egg form of a ribcage.

Stage 1

Head and torso

In this stage, you'll block in the main shapes of the head and torso. For the head, you'll use a generic head sculpt based on a ZBrush PolySphere. This frees you to focus on creating a character from the head, rather than sculpting a new face from scratch. This generic head is included with this tutorial's project files, and comes from my book *ZBrush Character Creation*.

You'll shape the head and torso using the Clip brushes, a suite of tools new to ZBrush 4. They enable you to make slices through geometry, creating interesting new shapes with hard mechanical edges.

**Video 4 00:00:05**

Keep human anatomy in mind as you build your mechanical parts: it makes the cyborg feel simultaneously familiar and strange

Video 5 00:01:02

Use the ShadowBox tool to build a gear based on your orthographic profiles, much like traditional technical drawing

Stage 2

Creating mechanical parts

We'll now look at how to create some detailed mechanical details for the cyborg. You'll begin by creating mechanisms to move the head and neck, with pieces based on the natural shape of the anatomy of this area.

To create these pieces, you'll use ZBrush primitives as well as some mesh generation tools that have been added to ZBrush 4. This stage is intended to illustrate how complex new pieces of geometry can be created on the fly. One of the methods you'll use is ShadowBox, a mesh generation technique that enables you to create new geometry by drawing it in orthographic front, side and top views. This is an incredibly fast way to create complex forms for further sculpting. You'll also use ZSpheres to quickly generate sections of mesh to sculpt into a spinal cord for the figure.

**Video 6 00:00:05**

Assemble a cyborg spine using ZSpheres, which you can then refine to create a more conventional bone-like appearance

**Video 4 00:00:05**

Base shapes on human anatomy

You'll begin by creating some mechanisms to move the head, based on the actual sternomastoids of the human neck. This will help the viewer understand the function of the parts. It also helps keep a human look to the head and neck while using inhuman elements, to maintain visual interest and character.

From the Tool palette, select a Cylinder3D tool. Via Tool > Initialize, set both X and Y Size to 20. Click Make PolyMesh3D to convert this primitive to a sculptable 3D mesh. Append this into your main cyborg ZTool.

You'll now create some greeble detail on the piston ends. Greeble (or 'nurnie') is a term from physical model making, particularly in the movie special effects industry. It means any mechanical detail shape that serves no purpose other than to increase the visual interest and complexity of the surface.

Mask some strips along the ends of the cylinder. Invert the mask, then use Tool > Deformation > Inflate to offset these details. Use the Transpose tools to move the piston into place and mirror it across via Tool > Deformation > Mirror.

Video 5 00:01:02

Using ShadowBox to create new geometry

We will now look at how to use ShadowBox to create new shapes – in this case, a clavicle and a gear. ShadowBox works by enabling you to draw across a three-sided box with a mask, defining a shape by drawing its shape in profiles. This makes it easy to create complex forms with negative space cutouts.

ShadowBox is loaded from the LightBox tool palette. There are several variations available, with values including 128, 256 and 512 that represent the resolution of the resulting mesh. Select the 512 resolution box.

Append this ShadowBox into your Cyborg as a SubTool and use the Transpose tools to place it in the vicinity of the clavicle. Select the MaskPen brush and draw the shape of the clavicle from above. This will instantly create the shape you draw. You can further refine the form by rotating to the front and drawing the shape from that view.

When you're satisfied with the shape, exit ShadowBox by selecting Tool > SubTool > ShadowBox: this places the new geometry in the SubTool menu. The gear is created in the same way.

Video 7 00:00:05

The rear carapace is grown from the torso object using the Clip brushes, with Trim Dynamic and Planar helping to add mechanical detailing

Video 6 00:00:05

ZSpheres and ZSketch

Next, you'll add a length of spinal cord to help add some more organic elements to the neck. This is created by using ZSpheres to generate the base mesh. Append a ZSphere to the cyborg ZTool and draw a chain as seen in the image. Convert this to a polymesh, then detail using the sculpting brushes.

Video 7 00:00:05

Refine the torso

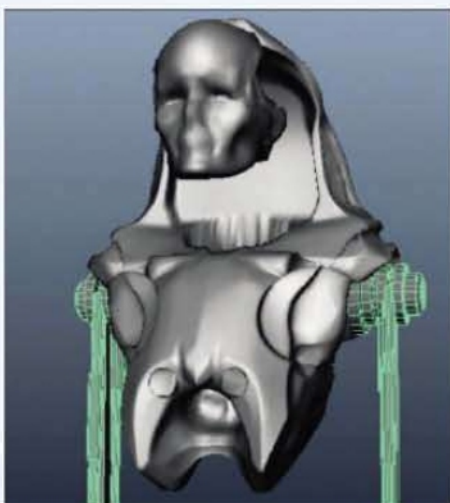
Pull a portion of the torso up behind the head to form the rear carapace. Once the basic shape is roughed in, use Clip brushes to shape the torso.

When creating the mechanical details of the torso, take advantage of the Trim Dynamic brush, the Planar brush and the Polish brush. Some basic planes are



■ **Video 9 00:00:05**

Use ZSketch to quickly block out a network of tubes, which fit into the sockets you created before. The Stitch1 brush helps you add a ribbed texture



■ **Video 10 00:00:05**

Switch to Maya to assemble the arms out of primitives, then use the GoZ plug-in to transfer the model into ZBrush

created using the Trim Dynamic brush, which enables you to polish and flatten the surface along a curved path. This can be helpful for creating machined surfaces such as car bodies. Use this brush to polish the curves of the torso.

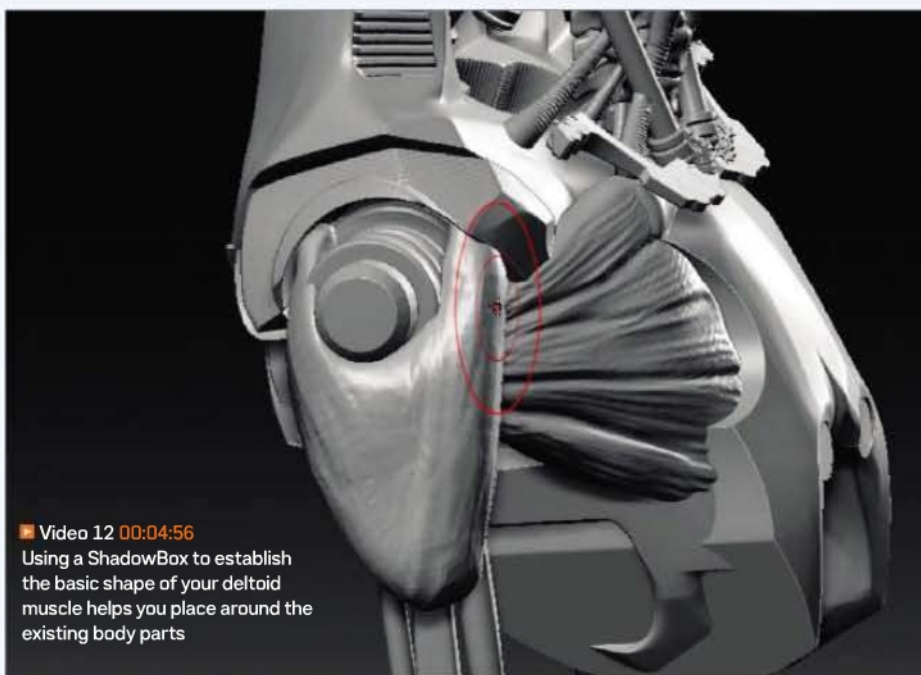
The Planar brush trims to a specific depth along the surface normal. This depth is managed under Brush > Depth by controlling the Depth Mask and Imbed options. Any areas that appear noisy or lumpy can be easily flattened by using the mPolish brush, which polishes out imperfections in the surface to leave a smooth, refined surface.

■ **Video 9 00:00:05**
Create the piping

The piping is created with ZSketch, a stroke-based modelling tool that allows you to build up geometry. It's well-suited to creating vines and tubes quickly and easily. Append a ZSphere into the cyborg ZTool. Enable ZSketch under Tool > ZSketch > Edit Sketch. You'll automatically be ready to start drawing strokes with the ZSketch brushes. Create the tubes, as seen in the video. When you're ready to convert them to

■ **Video 11 00:00:05**

Knowledge of human anatomy will help you recreate muscle structures to weave between the mechanical components



■ **Video 12 00:04:56**

Using a ShadowBox to establish the basic shape of your deltoid muscle helps you place around the existing body parts

geometry, select Tool > Unified Skin, set Resolution to 512 and click Make Unified Skin. Append this new skin into the cyborg ZTool. You may now delete the sketch SubTool.

The conduit ribbing texture on the tubes is created by selecting the Stitch1 brush. Replace the preset alpha with Alpha 59, rotated once with Alpha > Rotate. This creates a repeating rib texture along the length of the brushstroke.

Stage 3

Working with GoZ

In this stage, we'll look at ways to add new geometry to the cyborg model with third-party modelling tools. You'll use the GoZ plug-in, which

enables the seamless integration of 3D modelling software with ZBrush. GoZ supports Maya, 3ds Max, modo, Cinema 4D and others, but we will be specifically using it with Maya. The plug-in allows us to export our ZTool to Maya, where new geometry can be added, then brought back into ZBrush seamlessly. This adds a new level of flexibility to this project workflow, combining the strengths of the Maya modelling toolset with ZBrush.

■ **Video 10 00:00:05**
Create the arms in Maya

GoZ is a tool that links ZBrush with major third-party modelling and animation packages. I use it here to transfer models to and from Maya. When you click the GoZ button, ZBrush exports your current SubTools to



a Maya scene file. In Maya, you can make changes to the topology or even add new objects, then return them to ZBrush. You'll use GoZ to add basic arm structures using Maya primitives.

Hide the mechanical items in your cyborg design, leaving only the head and torso visible, then click Visible in the Tool palette. This exports only the visible SubTools to Maya. Maya opens with those SubTools in a scene file.

The arm is constructed from basic box and cylinder primitives. When you've finished modelling, select all the parts, then click the GoZBrush tab and click the GoZ button to transfer the new parts back to ZBrush. In ZBrush, append the new arm geometry into the cyborg ZTool.

Video 11 00:00:05 Create the chest muscles

As it stands, the head is the only organic element in the biomechanical character. So next, you'll add some muscle tissue that's intertwined with the mechanical parts to the rest of the body.

Append a PolySphere into the cyborg ZTool. Using the Move brush, shape it into a form consistent with the pectoralis fan. Notice how the muscle is shaped like a large fan extending from the arm bone: always try to mimic the forms of the natural body as much as possible when building this sort of biomechanical element.

To add the striations of the muscle tissue, add a few subdivisions to the mesh. Select the Rake brush, then turn on Stroke > LazyMouse (or press [L]). This will help you make long, even strokes along the muscle surface.

Video 12 00:04:56 Construct deltoids

Add deltoid muscles with the help of a ShadowBox, making sure that they weave over the pectoralis and around the mechanical articulation of the shoulder. The muscles of the biceps and forearm are created with ZSketch, as can be seen in Video 13.

Stage 4

Rendering passes

In this stage, we'll look at the new render and material options available in ZBrush 4. Best Preview Render – or BPR for short – is a new rendering mode that uses accurate shadowing, as well as new shaders for subsurface scattering and ambient occlusion. You'll make use of the render pass options, which will automatically render passes for each map and prepare them for export. You can composite these maps in Photoshop for a final presentation image.

Video 14 00:00:05 Store views with Timeline

Before you begin to light and render the model, the first step is to save any views you want to render. This ensures that you can easily recreate the same model position if you need to return at any point and render new passes. The easiest way to save views is to keyframe the model's position with Timeline, a new animation tool built into ZBrush 4.

To store your model's position, start by opening the Document menu and turning off WSize. Set the document size to your preferred render size. When using BPR, you don't need to AAHalf the document (Zoom > AAHalf), so you can set it at the actual resolution you want to export.

Next, select Movie > Timeline > Show. To store views, simply position the model in a view you like and click under the time mark on the timeline to add a keyframe. Move ahead a single frame and repeat the process for each view you want to store. Save the file as a ZBrush Project via File > Save As. Projects store

all of your model, texture and timeline info in one file, for easy retrieval later.

Video 14 00:01:47 Render passes

Select Render > BPR Shadow and raise Rays to 50 and Strength to 0.8. These are my preferred settings, but I encourage you to experiment with the slider settings to find the shadow look you prefer.

Via the Light menu, position the key light. Turn on the second light and raise Intensity to its maximum value. Click once on the light sphere to place it behind the object. Move this light to the side to create a rim light. This will help define the figure from the backdrop. Back in the Render menu, enable AOclusion for ambient occlusion and click the Create Maps button. Press the BPR render button to render the passes. When the render is complete, click on each render pass icon and export the associated PSD file. If you stored multiple views to render, move to the next keyframe and repeat the process.

Video 14 00:03:50 Composite in Photoshop

Take the images exported from ZBrush and import them into Photoshop. The passes will be loaded into a single PSD file. This can be automated in newer versions of Photoshop by selecting File > Scripts > Load Files into Stack.

The passes will be called Image, Depth, Ambient Occlusion and Mask. Image should be the bottom layer, with Ambient Occlusion set to Multiply one layer above. The Depth layer is useful for depth-of-field effects while the Mask layer is helpful for quickly selecting the figure or background. ●



Video 14 00:00:05

The animation timeline built into ZBrush is a crafty way to store various shot angles so you can always return to them later

Video 14 00:01:47

Choose the render passes you want to create, ready to export to Photoshop to assemble the final image



FOR
Any 3D software

TIME TAKEN
15 minutes

TOPICS COVERED
• Interior lighting
• Simulating bounce



ON THE WEB
• Video tutorial
• Project files
3dworldmag.com/139



Scene features Luxury Suite 01, created by Moon3d and available at turbosquid.com

Lighting basics

PART 3 Michael McCarthy continues his series on all aspects of 3D illumination techniques with a look at interior lighting

Interior lighting can be rather challenging. If you start with a good base, however, you can usually achieve good-looking renders with quick render times. When working with interior lighting it's important to focus on light direction and bounced light. Fill or bounce lights play an important role in realistically lighting an interior environment, since basic 3D lights do not bounce like actual light in the real world. When a standard 3D light hits a surface, it stops, whereas a real light bounces off a surface, casting light and colour on objects around it. This is important to consider when doing interior lighting because there are many surfaces for light to bounce off. This type of bounced light can be achieved by setting up multiple point lights to emulate the real world effect, or by using final gather/global illumination techniques.

As usual, your focus should be on the camera. Even when doing an interior shot, you want to light for the camera shot. Don't try to light the entire room using fixtures; it is a common mistake to start off this way. Adding lights to your three-point lighting solution in order to show a particular fixture casting shadows or a stronger light in that area is a better approach. Pure simulation renderers such as Maxwell Render or Thea Render can do physically-based lighting, but that's usually not something used in production since it causes longer render times and can be tricky to set up. In many cases, the same is true of global illumination and other advanced lighting techniques. A good traditional lighter can usually get you to the same place with a bit of skill and in a fraction of the render time.

In order to start your traditional interior lighting set-up, pick your camera shot, then pick the major light sources and start setting up a three-point lighting scheme from there. In the video accompanying this tutorial, we'll start by creating a direct light going through the window. This light should cast shadows. In this case, we will use raytrace shadows because the light must go through a transparent curtain. Next, a few spot lights are placed, pointing in a downward direction from the ceiling. These spot lights should have a very large falloff so that they can fade down the walls of the room. All of these lights cast shadows and because many of the shadows inside are soft, you can use shadow maps and blur them out to your liking.

Next, you will want to look at your key lights and carefully place some point lights as bounce lights in order to carry the colour and additional light to dark points in the scene. Using attenuation on these point lights helps to control how much light you get and where it goes. You can spend some time setting up bounce lights, colouring them and placing them around the scene to get a nice result – in the end it should pay off with a quality render that does not take eight hours to process. If you're trying to achieve an even more photorealistic quality, this is also a great place to start. You can remove a few bounce lights and apply final gather or tune a global illumination solution for your scene. ■

Next issue: Part 4
Michael transfers his lighting techniques to the great outdoors – don't miss his in-depth video tutorial




About the author
Michael McCarthy is an accomplished 3D artist and Autodesk

Certified Instructor working in broadcast, feature film, and games. He has recently given Master Classes at SIGGRAPH 2010 and EUE 2010
mmccarthy.com



WATCH THE VIDEO TUTORIAL
Learn how to create great interior lighting with faster render times in the video tutorial online

WIN THE HOLIDAY OF A LIFETIME TO FIJI

WITH ADVENTURE FOOTWEAR BRAND 

Adventure footwear brand Teva, is offering one lucky reader (and friend) the chance to escape to paradise. No it's not a dream, it's a real life once-in-a-lifetime opportunity to experience the spectacular Upper Navua Gorge in Fiji and live aboard and sail a luxury adventure class 140' yacht plus kit you out as only Teva can.

If you're in luck come April 2011, you will be flown from the UK to Fiji's Viti Levu Island. Your adventure will begin with a river trip by raft that will take you to the remote Upper Navua Gorge, where the black lava rock walls overgrown with cascades of lush ferns are so remarkable that this stretch of river has been hailed "a river of Eden." Here you will join the party on the 140-foot Tui Tai sailboat, living aboard in laid-back luxury, taking in the truly awesome tropical sights and cruising leisurely to remote locations only accessible by boat. You will be able to snorkel over reefs that are a hundred miles from the closest resort, go on epic hikes off the beaten path and meet local villagers and learn their customs. It really is a trip to the heart of paradise.

Teva are no strangers to adventure or being off the beaten track. The Teva House concept first came about in Vail during the Teva Mountain Games in June 2010. Teva established its presence at a specially selected and equipped house in the resort that became the perfect hub where athletes and contest winners could mix and mingle in a chilled-out, inclusive environment. For 2011 Teva has taken the Teva House one step further by creating the Teva Houseboat experience – aboard the Tui Tai in the waters of the South Pacific.

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Step-by-step
Vue
Illustration

FOR
Vue 9 Infinite

TIME TAKEN
40 minutes

TOPICS COVERED
• Tropical lighting
• Realistic water
• Terrain creation
• Wet materials



ON THE WEB

- Video tutorial
- Scene files
- Full-size screenshots

3dworldmag.com/139



About the author
Dax Pandhi is a leading artist and trainer of dramatic natural environments.

Through his website QuadSpinner, he invents and teaches groundbreaking techniques for Vue. He is also the author of *Realism in Vue*, an advanced book on digital nature techniques
daxpandhi.com

Learn how to tweak
water settings for a
tropical look

Add realism
with EcoSystem
materials

Create a Costa Rican shoreline

The scene may look simple, but getting the perfect interplay of rock, sand, water and light requires an expert eye. Vue artist **Dax Pandhi** shows you the tools and tricks behind building a tropical paradise



Alter default lighting
parameters to simulate
intense tropical sunlight

The tropical beach is one of the most popular natural environments to try to simulate – but it's also among the hardest to get right. In this tutorial, we'll go through a simple but powerful process for setting up a tropical beach environment with the least amount of effort, but still come out with a striking, realistic result.

Every environment has core elements in common: rocks, terrain, plants, and so on. What sets a tropical environment apart from others is the lighting, and that will be our primary focus. Rather than work with the familiar workflow of setting up the basic environment and then creating the right atmosphere, you'll start this project by setting the lighting first, then work with that intense light to prepare the rest of the scene to adapt to those conditions. You'll use some photographic references from Costa Rica to understand the key principles of tropical lighting,

making the scene as realistic as possible. To create the perfect tropical beach setting, you'll create a strong water surface that captures all the colour, light, and movement required for making a scene look tropical and dramatic. This is one of the easiest pitfalls to fall into; a badly designed water surface can make a tropical scene look like a simple lake or a non-tropical ocean.

You'll also focus on creating submerged objects. The main beach terrain will be made using Vue's terrain creation tools, and will be visible both above and below the water surface to achieve true tropical water coloration. You'll create coral by using materials, and beachside rocks using HyperTerrains that are partially visible beneath the water's surface. Such extra details ensure that the viewer feel that there's more to this scene than you're showing; they contribute greatly to the realism of the render. »



WATCH THE VIDEO TUTORIAL
Follow the entire workflow for creating
this scene with Dax Pandhi's video
3dworldmag.com/139

STAGE ONE

Tropical lighting

To ensure proper lighting, you'll create an atmosphere using Vue's spectral atmosphere model, and use key lighting principles from reference photographs. Sunlight in the tropics is usually very strong, yet the shadows are not completely dark. To achieve this, you'll use global radiosity. When a scene has intense light, it often helps to have it set up front. Material creation may require some colour compensation, which can mean extra work if the lighting is set up later in the workflow.



01 Tropical lighting from reference

This location photo shows lighting that's typical to the tropics: strong light, not-too-dark shadows, and a lot of sky-reflected light. The high amount of indirect light bouncing off all objects is mandatory to make the scene look natural. To achieve this effect, you should use the global radiosity lighting model.



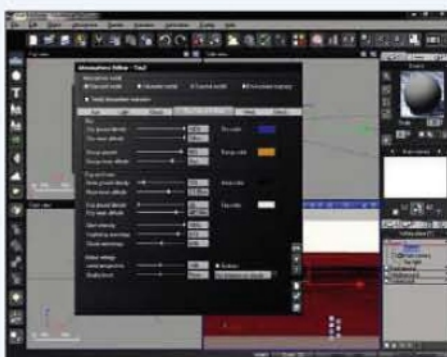
02 Simulating tropical lighting

You'll use Light Intensity and Global Radiosity Gain to simulate the principles mentioned in the previous step. Another aspect of lighting you'll use is to bias the lighting towards strong shadows and less ambient light, forcing the use of Sky Dome Lighting Gain for creating the ambient light, combined with light that's reflected through the use of global radiosity.



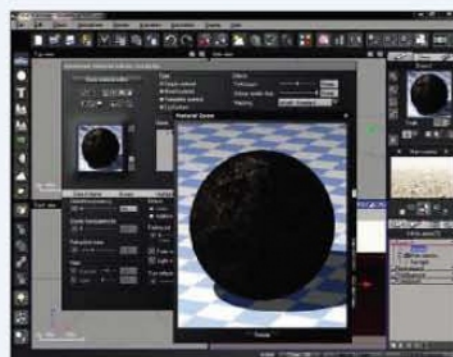
06 Primary atmospheric details

In the Atmosphere Editor's Light tab, you can see the primary drive behind the lighting. By setting Light Intensity to +0.45, the sunlight becomes very strong. Pushing Light Balance down to 90% causes strong, dark shadows. By themselves, the shadows look unrealistic – but by using 6.0 for Sky Dome Lighting Gain and 0.7 for Global Radiosity Gain, you infuse realistic reflected light.



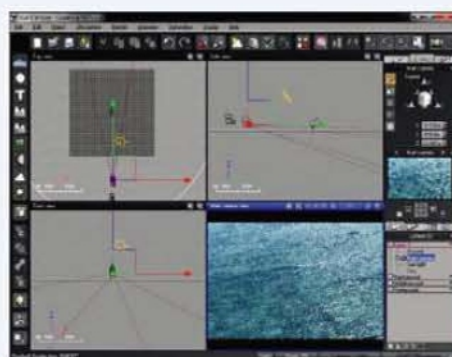
07 Secondary atmospheric details

While all the settings in the Sky, Fog, and Haze tab interlock to create the final effect, it's important to point out that 100% Glow Intensity combined with 0.74 Scattering Anisotropy helps to create the glow of the strong sunlight. Scattering Anisotropy pulls the glow back towards the sun rather than into the camera.



08 Establish base surfaces

Select the Ground infinite plane and load the material Corallite.mat from the project files. This material adds coral-like features to the ground, which will be refracted in the water. Note that the material is dark in the material preview, but looks more normal in the scene due to the intensity of the light. This is how you compensate for the lighting – by making materials darker.



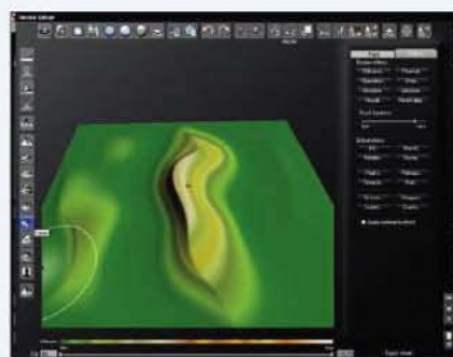
12 Set the camera

Choosing the Widescreen aspect ratio for the render, you're now ready to set up the camera for the scene. Load CostaRica12.vue from the project files to get the camera angle you'll use for the render; it also includes the settings from all previous steps. The camera has Always Keep Level turned off, and you can use a slight tilt (352°) in the Roll Angle to show the open ocean in the distance.

STAGE TWO

Submerged terrains

With the essence of the scene ready, you'll start adding both the main beach terrain, as well as on- and off-shore rock formations created using HyperTerrains. Because the HyperTerrain technique of using MetaBlobs with displacement on them is beyond the scope of this tutorial, you'll load existing assets provided as VOB Vue objects. You'll also set up a 'wet level' on the beach terrain to simulate the ebb and flow of the tide, which will turn the sand wet and result in a slightly darker colouration. You'll also choose specific placements for your terrain and HyperTerrain objects, to create the perception of a larger landscape than is visible.



13 Create a beach

Add a Standard Terrain at a resolution of 256 x 256. Select Object > Edit Object to go to the Terrain Editor. Select the Dunes preset from the left toolbar to create dunes. Usually with this resolution, it will create a couple of dunes. Click the Zero Edges button to create a smooth transition for the terrain, so it can be merged with the ground terrain.



03 Tropical waters

This photo shows the essence of the water you want to capture. By selectively blurring the image – by applying Gaussian Blur in Photoshop, for example – you can come up with colour values to use for the Vue water surface. This image also portrays how reflections and highlights on the water surface should look on the Vue counterpart.



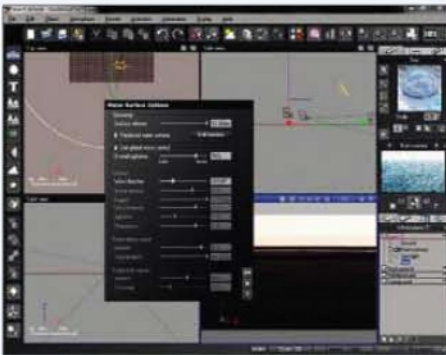
04 Disable gamma

If you have gamma correction enabled, disable it: select File > Options, then click the Gamma Options button to access the control. If gamma correction is required for your own project, however, you may need to adjust the colour values shown throughout this project to take the gamma requirements into consideration.



05 Load the atmosphere

Via Atmosphere > Load Atmosphere, load Costa Rica.atm from this tutorial's project files. Everything in the scene will appear bright and overexposed, but that's the intended effect. As you add assets to the scene, you'll create dark materials that will interact appropriately with this bright atmosphere to make a coherent result.



09 Sea and waves

Add a Water Surface. Select Object > Edit Object. Enable Displaced Water Surface and set Surface Altitude to 17.5m, Overall Agitation to 76% and Wind Direction to 104°. A non-standard wind direction helps juxtapose the waves with the camera angle. Since your view will be relatively due north, 104° is a good angle.



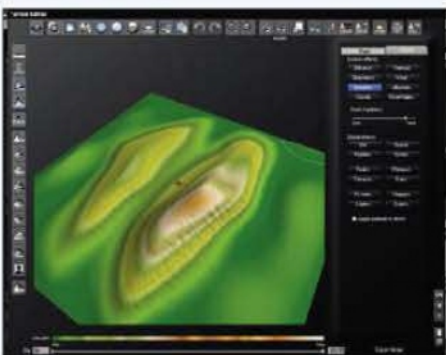
10 Water reflections

Real water reflects a lot of light. Edit the material for the water surface. Set the Foam layer's Alpha Boost to -100. In the default Water layer, switch to the Transparency tab, then set both Fading Out and Turn Reflective With Angle to 30%. Change Fade Out Color to R 33, G 77, B 78. This colour is derived from actual photos of the Pacific Ocean; it provides a fresh blue water surface in final renders.



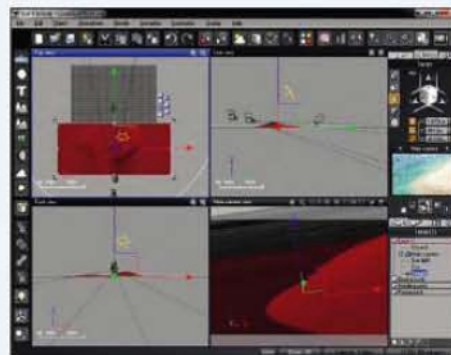
11 Shiny water

Real water also shines more than Vue's default water. In the Highlights tab, set Highlight Global Intensity to 49%, Highlight Global Size to 100% and Anisotropic Highlighting to 56%. The high anisotropic value and the sharpness of the highlights enable a widely dispersed, sparkling effect on the water, making it look realistic and inviting.



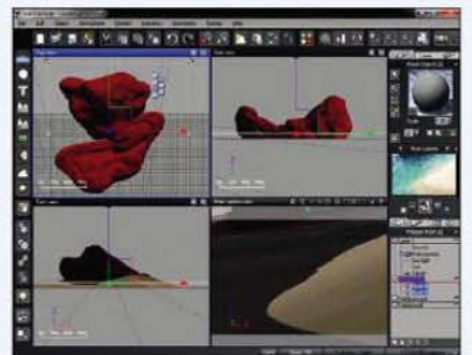
14 Erode the terrain

Double the terrain resolution to 512 x 512. In the Effects tab, set Rock Hardness so the Soft to Hard ratio is about a quarter. Apply the Dissolve Erosion effect three times, Alluvium Erosion twice, and Diffusive Erosion four or five times. This will create a good-looking, water-eroded beach terrain. You may need to manually touch up the terrain. Alternatively, load Beach.vob for a final terrain.



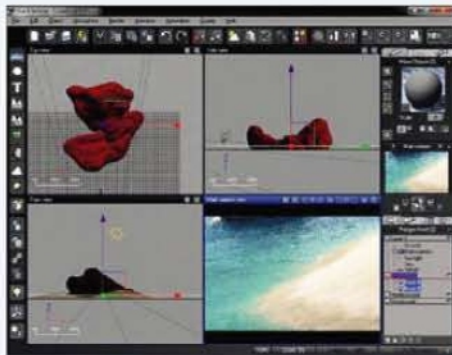
15 Place the beach

Stretch the Beach terrain horizontally (along the X axis) in the Top view so it is twice as wide as it is long. Squash it vertically in the Side view so it doesn't look mountainous. Place it so that the bigger dune is half visible in the right side of the frame as you look at the main camera view.



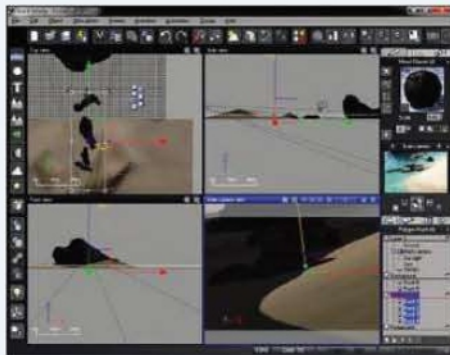
16 Background HyperTerrains

Next, you'll introduce three HyperTerrains from the project files to use as rock formations. First, bring in BG_HyperTerrains.vob via File > Load Object. As shown in the screenshot, place it in the far distance so only the base is visible in the top of the frame. Ensure that the HyperTerrain is submerged into the water and the ground.



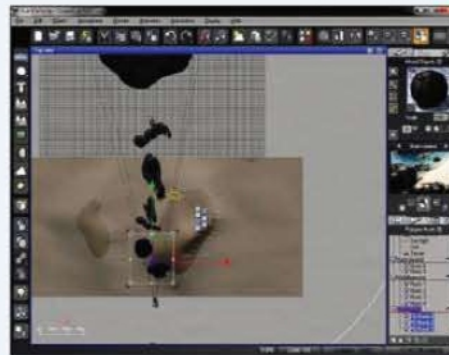
17 Reflected perception

By adding a large HyperTerrain mostly out of view, you get to see the reflection in the water. The result of this is colour variation in the water surface, making it seem more realistic. More subtly, it implies to the viewer that there's a larger world than what is merely visible. Such tricks go a long way in making a render look grander.



18 Middle HyperTerrains

Next, load MG_HyperTerrains.vob. These HyperTerrains create a middle-ground field of rock formations to show a connection between the distant rocks and the foreground. These should also be submerged, so that several parts of the rocks jut out from the water to create a realistic connected-yet-disconnected feel for the formation.



19 Foreground HyperTerrains

Finally, load FG_HyperTerrains.vob – the three rocks for the immediate foreground. Place them close to the bottom of the scene (Top view) and let them extend beyond the frame, to echo the effect of the distant rocks. The rightmost rock should overlap the beach terrain. You'll add some vegetation to these rocks later. You can also load CostaRica19.vue to have all HyperTerrains pre-loaded.



22 Customise the beach material

Edit the SimpleBeach material. In the Advanced Material Editor, change Type from Simple Material to MixedMaterial. Load SimpleBeach.mat again into the second slot. Rename it as **WetBeach**.



23 The 'wet sand' look

In the Color & Alpha tab of the WetBeach material, change Color Correction to R 145, G 126, B 108. This enables the material to remain just like the dry sand material, with uniformly synced bumps, but the altered colouration clearly indicates wet sand. Duplicating the material enables you to transition materials without changing the shape of the bumps.



24 Create sand levels

In the root material layer, select the Influence Of Environment tab. Enable Distribution Of Materials Dependent On Local Slope, Altitude, And Orientation. In the Influence Of Altitude section, set Altitude Range to Relative To Sea and Transition Altitude to 5m. See the screenshot for the other settings. In the Materials To Mix tab, set Smooth Blending Strip to 11% for a smooth transition.

STAGE FOUR

Render optimisations

In the final stage of the project, you'll prepare your image for rendering. Normally, you can go ahead and render the image as-is, but you can achieve a faster render if you make some tweaks. With the angle which the main camera is at, a displaced water surface can take a long time to render. While you won't alter the displacement itself, you can tweak how refractions are rendered by taking advantage of Vue's Subray Quality Drop feature, as well as texture anti-aliasing boosts, and custom render settings. These adjustments will result in a faster and better-looking render output.



28 Subray quality

Select the Water Surface and edit the material. In the Effects section in the top-right, set Subray Quality Drop to -0.5. You could experiment with more powerful values, depending on your requirements. Essentially, you're making the subrays that determine the refraction quality of objects underneath the water surface use less aggressiveness. This results in faster renders.



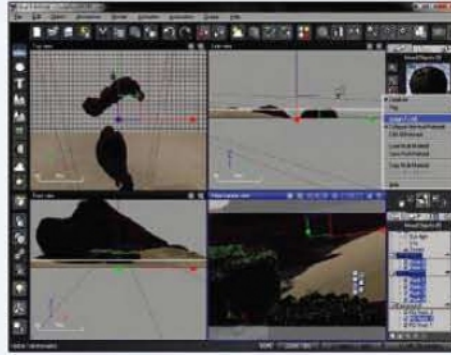
29 Texture anti-aliasing boost

Just as you don't need excessive detail from underwater refractions, you don't need too much detail in the distant rock formations. Select the background HyperTerrains and edit their material. In the Effects section, set TAA Boost to -1. Again, experiment with different values to establish the result you prefer.

STAGE THREE

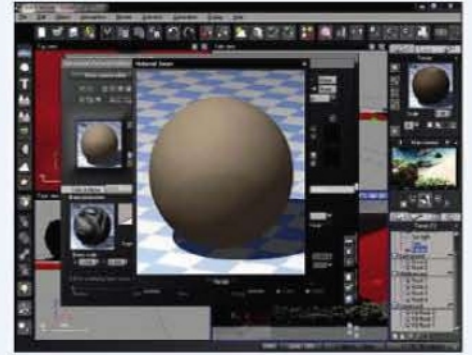
Working with materials

With all the essential assets in place, the next step is to create and apply the materials for the scene. To create a realistic beach terrain, the sand needs to have a wet shoreline – the telltale sign of waves lapping the shore. A tropical environment without something green would look barren. You don't want to needlessly add palms, which would be impractical for this field of view, so you'll create a subtle grass EcoSystem in the foreground instead.



20 Rock formation material

Apply the same material as the ground plane, CoralLite.mat, to all the HyperTerrains. This will help them merge into the ground plane: materials in Vue use fractals, so applying the same material to nearby objects helps fractals merge into each other quite easily.



21 Beach material

For the beach terrain, load SimpleBeach.mat from the project files. This is a modified version of the sand material that ships with Vue, made slightly darker to compensate for the light. You'll use this material as a base for creating a more complex beach material.



25 Create foreground grass

Select the three foreground rocks and edit their material. Set Type to EcoSystem. Add an instance of Long Grass to the EcoSystem. In the Density tab, set Overall Density to 69%. You don't want strong, dense grass – just the sort of random patches that may be found on fertile rock formations near water.



26 Natural randomisation

In the Scaling & Orientation tab, set Maximum Size Variation for the X axis to 5.00, while maintaining Keep Proportions at 100%. This will help simulate randomness in the grass size, which occurs everywhere in nature. By keeping proportions, you ensure that grass instances are not warped out of shape. In the Color tab, change Color Correction to R 66, G 86, B 46 for a more natural grass colour.



27 Limit the EcoSystem range

You don't want the grass to take over the rocks completely. To control this, limit Altitude Range in the Presence tab, setting the range from 0.91 to 1.00. The cutoff for the EcoSystem at the bottom should be soft and not stark, so set Fuzziness (Bottom) to 11%. Click Populate to instantiate the EcoSystem. Alternatively, load CostaRica27.vue, which has all the materials in place.

30 Final render

Select Render > Render Options. Set Preset Render Quality to Broadcast: this is the minimum setting required to anti-alias the scene's fractal textures. The finished scene file is available as CostaRica30.vue, with all steps in place and ready to render. With all the separate pieces in place, all that remains is to render the final image. Be warned that due to heavy displacement on the water and the presence of over 17 million polygons in the scene, it may take a while to render. However, the results are worth the wait. As you can see by the image here, within a short time you can create a rich tropical natural environment. This project is now ready to be expanded or animated: you could add a character walking on the shore, for example, or use it as the base for an elaborate matte painting. ■



Expert Tips
Vue Frontier
Illustration

FOR
Vue 8 Frontier

TOPICS COVERED

- Working with atmospheres
- Editing materials
- Terrains and water surfaces
- Working with light



ON THE DISC
• Vue 8 Frontier
(full software)

**COMPLETE
SOFTWARE**
Vue 8 Frontier
is on the disc



■ Vue 8 Frontier is capable of rendering amazingly detailed images in the right hands

Make great scenes with Vue Frontier

Explore the full software on this issue's disc as [Dax Pandhi](#) takes you beyond the basics to create beautiful renders



Dax Pandhi is a leading artist and trainer of dramatic natural environments. Through his

website QuadSpinner, he invents and teaches groundbreaking techniques for Vue. He is also the author of *Realism in Vue*, an advanced book on using digital nature techniques creatively.
daxpandhi.com



elcome to my collection of tips intended as a quick boot camp to help you work better with Vue 8 Frontier, your complete software package on this issue's disc. Vue is designed to simulate the effects of nature as you create outdoor scenery for your renders and animations. But nature is full of subtlety, and by following these rules in Vue, you'll be able to create more realistic-looking renders.

These tips are condensed pieces of knowledge based on thousands of hours of working in Vue. They were chosen to give you a strong foundation in the most important aspects of creating natural scenes: atmosphere and light, terrains and materials. Through them, you'll explore key tools

in Vue 8 Frontier, including the Atmosphere Editor (accessed via Atmosphere > Atmosphere Editor) and the Material Editor, which you can open by double-clicking the Material Preview in the top-right of the screen.

Despite its specialist purpose, Vue is 3D software, and behaves with the basic principles common to all 3D packages. This will help you get off to a quick start. These tips and tricks show you the key techniques you can apply to get more realism out of your scenes – as well as save yourself a few headaches...

We'll kick off this article with the simplest, yet most important tip of all: observing nature is the best way to learn how to add more realism in Vue.



01 Atmospheric scale

In Vue, as opposed to most other 3D design packages, scale is the key to keep your renders looking realistic. The Aerial Perspective property in the Atmosphere Editor's Sky, Fog and Haze tab controls the atmospheric scale of your world. At 1.00, everything is real size. At 2.00, a single metre is interpreted as 2 metres, at 3.00 as 3 metres, and so on.

This allows you to control the general atmosphere scale and add grandness without enlarging your scene – although your best bet is to keep it as close to real as possible. This allows everything else to be designed in sync with real-world sizes, resulting in the most realistic scenes possible.

■ Altering atmospheric scale gives noticeable results, sometimes at the expense of realism



■ Light decay adds realism, but it's important to keep it within reasonable limits

02 High-intensity decay

New Vue users tend to create high-decay, very orange sunset scenes. In the real world, few sunsets are that orange. As light travels through more distance in the atmosphere at twilight, it becomes orange. Keep Decay Mean Altitude under 4km in the Atmosphere Editor for a realistic result where the sky is only tinged with orange, but the light on the ground is highly decayed. Control this further by desaturating the Decay colour.

03 Volumetric lighting

Vue has its volumetric lighting function turned off by default. You can enable it in the Sky, Fog and Haze tab of the Atmosphere Editor. By enabling Volumetric Model under Atmosphere Model, you get realistic lighting that's stopped and dispersed by objects as the light hits them. An additional plus of volumetric lighting is that when you have large-scale objects that occlude the sun, you get giant shafts of light created by volumetric light and shadows. If you want volumetric shadows only for creating shafts of light through clouds, simply tick the Godrays option.

■ Volumetric lighting can look particularly dramatic with backlit scenes

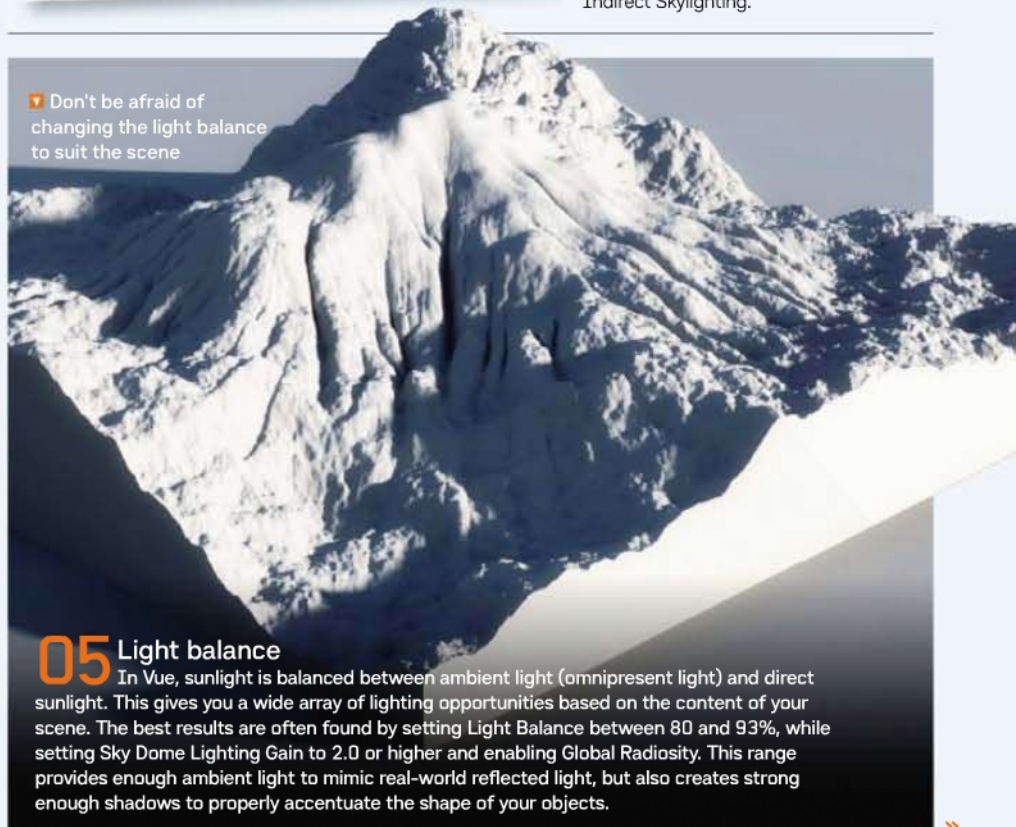


■ Subtle colour bleed via Global Radiosity can make all the difference

04 Global radiosity

Of all the lighting models provided in the Atmosphere Editor's Light tab, Global Radiosity gives you the best results, at the price of slowing down your render somewhat. With Global Radiosity enabled, your scene's lights not only bounce off the objects, but also bleeds a tiny bit of the reflecting object's colour with it. This is how light operates in the real world. If you would like to increase the light and colour bleed, increase the Gain value. For realistic reflected light from the atmosphere itself, turn on Indirect Skylighting.

■ Don't be afraid of changing the light balance to suit the scene



05 Light balance

In Vue, sunlight is balanced between ambient light (omnipresent light) and direct sunlight. This gives you a wide array of lighting opportunities based on the content of your scene. The best results are often found by setting Light Balance between 80 and 93%, while setting Sky Dome Lighting Gain to 2.0 or higher and enabling Global Radiosity. This range provides enough ambient light to mimic real-world reflected light, but also creates strong enough shadows to properly accentuate the shape of your objects.

» 06 Material scale

Vue uses fractal functions to create the majority of its materials. Since fractals do not follow UVW mapping and stretching as bitmaps would, you may need to adjust the overall scale of the material. The Scale value can be found either in the Material Editor, or right under the Material Preview in the main window. When you make your object larger, it's often helpful to increase the scale. As you make the object smaller, a value below 1.00 may be required.



▲ Fractal materials such as this sometimes need a change of scale



▲ Using absolute ranges for material layer distribution simplifies the process

■ One corollary of changing material scale is the need to alter bump size too



07 Material scale versus bump size

One common problem is that bumps may look either too intense or too light when you change your material's Scale. Due to the Vue material's usage of fractals, changing the scale of the material sometimes alters the bump scale. A general rule of thumb is to increase Depth under the Material Editor's Bumps tab when you decrease Scale, and decrease Depth when you increase Scale. If you increase it too much, the object may not look realistic – at which point you should enable displacement mapping.

08 Measured layering

If you are creating a large-scale terrain – for example, a fantastical island that has beaches, forests, a rocky mountain peak and snow covering the tip of the peak – a single material with several layers can accomplish this task easily. Add a layer for each type of material you require. Switch to the Environment tab of the Advanced Material Editor and set Range of Altitudes to Absolute. The Altitude Range sliders now accept specific values in metres. You can specify an absolute range for each material layer by dividing up the total altitude of your terrain.

It's important to note that while the sliders may only go to specific values (minimum or maximum), you can enter a higher or lower value in the text box next to them. Always try to employ a bit of Fuzziness to blend the layers.



■ Change a material's origin to prevent objects that use it from looking too samey

09 Material origins

If you're duplicating an object repeatedly in your scene, the materials may look too similar. To avoid a duplicate look, go to the Advanced Material Editor for each object. Switch to the Effects tab and enter new values in the X, Y, and Z axes of the Origin of Material section. You can experiment with random values to find the right ones for your scene. The origin of the material only works well with fractal materials, as opposed to bitmap materials. The origin changes the fractals underneath by randomising their shapes, resulting in a similar yet different-looking material that enables you to have duplicate objects next to each other.

10 Create layered materials

Creating your own materials from scratch can take some practice, but combining material layers is a quick method to create complex materials for your scenes. Vue has Photoshop-style material layers, through which a complete self-contained material can be added on top of another. In the Material Editor, the Add Layer button enables you to choose a material from

the library. By switching to the Advanced Material Editor, you can select the distribution and alpha (mixing value) of the layers. In the Environment tab, you can fine-tune where and how the layer appears, while in the Bumps tab, you can choose to have the layer's bumps either add or replace the bumps underneath. The Vue Material Library has a category called Material Layers; these are a great starting point.

■ Study existing layered materials to see how they're constructed



11 Displaced water surfaces

Vue has two types of water surface: normal and displaced. You can displace a water surface by right-clicking it and choosing Edit Object, then ticking Displaced Water Surface. This enables fractal displacement of the water, creating physical waves rather than the default, bump-mapped waves. You can control the shape of the displacement with the Overall Agitation slider. A good trick is to use a displaced water surface even when you need calm, flat water – simply use a very low Overall Agitation value. The effect of physical waves makes all the difference.



■ In nearly all cases, water should use displacement mapping for realism

12 Faster material rendering

There are two important time-saving features in the Advanced Material Editor. TAA boost (Texture Anti-Aliasing) enables you to choose which specific materials (as opposed to the entire scene) should have their textures anti-aliased more or less. This enables you to provide high quality for certain objects, like the

main subject of the render, while lowering the quality and render time of distant, minute objects.

Similarly, Subray Quality Drop helps process subrays faster with features such as refraction by sacrificing a little bit of quality. This can be helpful when you have an intensely reflective water/glass surface, and the items inside are less important.

■ Balance quality against speed to achieve high-quality results in the minimum time



■ Combined terrains that use the same material are rendered as one object

13 Combine terrains

Instead of trying to add too much detail to a single terrain, you can combine multiple terrains to create a larger, more complex scene. Combining terrains is easy as long as all terrains have the same fractal material. When two objects with the same type of material are moved into each other and overlap, Vue renders them as if they were a single object. This enables you to create complex shapes without losing control over the rest of the terrain.

If terrain edges are a problem, use the Clip slider in the Terrain Editor to shave off the bottom and have a non-square base for the terrain. This will help you rotate and merge terrains more easily.

14 Large-scale worlds

If you want a truly epic render, don't shy away from creating a really large world. The ground plane grid and atmosphere boundary (the circle shown in the viewport) are just guides to show you the size of the world. In reality, terrains are often many kilometres wide, and the visible distance can be a dozen kilometres or more!

When you create large terrains and distances in your scene, the atmosphere engine will process them as such (as long as Aerial Perspective in the Atmosphere Editor's Sky, Fog and Haze is 1.00 or so), and create the prevailing sense of grandness in the terrains. A quick trick to add to the majesty of the scene is to place the camera lower to the ground and have it look a little upwards.

■ Grandiose renders usually require a correspondingly huge world size



15 Imported models

When you import models from third-party software such as Poser or 3ds Max, it's a good idea to go through all the imported materials. The most relevant settings to check in the Advanced Material Editor are Depth in the Bumps tab, and Highlight Global Size.

16 Better rocks

If you feel that the default Vue rocks lack detail, a quick way to enhance them is to use Displacement. You can either create your own material or use one of the Displacement Materials that ship with Vue.

17 Unlock the camera level

In your camera's Aspect tab, deselecting the Always Keep Level button in the left sidebar allows your camera to be rotated freely on all axes. A slightly tilted horizon can create a great effect while composing a scene.

18 Unlock the camera height

Vue's camera is locked to a specific height above the highest infinite plane (ground or water). You can unlock the height in the camera's Aspect tab. This enables you to keep your camera steady when you move infinite planes, and even take it below the surface. ■

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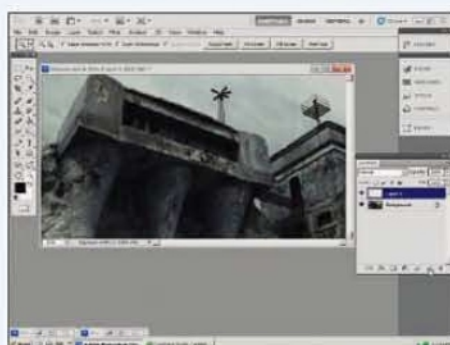
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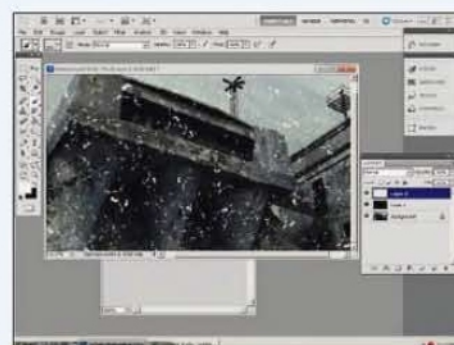
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address below and we'll try to find
a solution. Include your scene file
(no larger than 5MB in size, please)
if it helps to illustrate the problem
qa@3dworldmag.com

Several composite
layers of falling snow
can add the perfect
finishing touch to
your render



The base render could benefit from some
environmental flourishes: it's about to fall victim to a
cold front moving in from the North...



Custom brushes are an effective way of creating
a complex particle system, and can offer more
control over the result than an automated process

Photoshop "How can I add snow to a scene in post-production?" Stephen Jones, via email

Richard Tilbury replies:

There's no quick solution to adding a layer of snow to
your 3D scene – but if you simply want to add falling
snow, it can be done effectively in Photoshop.

Starting with your base render (or Outpost_Start.
psd in this Q&A's project files), create a new layer and
fill it with black. Select Filter > Noise > Add Noise and
set Amount to around 30%. (This value needs
adjusting depending on the size of your render.) Next,
select Image > Adjustments > Levels. Adjusting only
the Input Levels, move the left slider to around 70

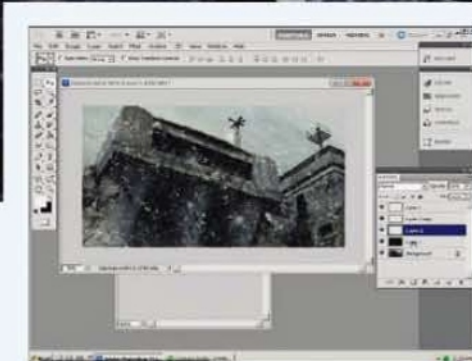
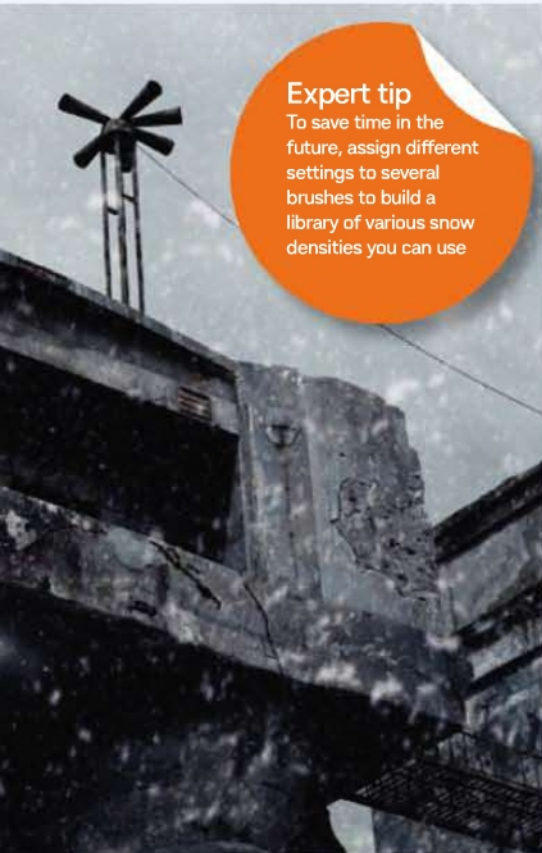
and the middle one to 0.6 or thereabouts. Select
Filter > Blur > Gaussian Blur and alter Radius to 0.5.
Set the layer's blending mode to Screen.

You'll now create a custom brush for making the
snowflakes. Open Tree.jpg from the project files.
Using the Marquee Tool select an area of leaves
about 150 pixels square. Select Image > Crop, then
desaturate it [Shift]+[Ctrl/Cmd]+[U] before
increasing the Contrast (Image > Adjustments >
Brightness/Contrast). Use black to reduce the areas
of white, leaving only a sparse pattern of small white
shapes. Once done, invert the image [Ctrl/Cmd]+[I].
Select Edit > Define Brush Preset and name the
brush, which will appear at the bottom of your brush
palette. (You can also open Snow Brush.jpg from the
project files, and define it as a brush.)

After defining the preset, select the Brush Tool
followed by Window > Brushes, and click your new
snow brush. Under Brush Tip Shape, alter Spacing to
79%. Under Shape Dynamics, change Angle Jitter to
around 30% and enable Flip X and Y Jitter. Under
Scattering, change Scatter to 31% and enable Both

Expert tip

To save time in the future, assign different settings to several brushes to build a library of various snow densities you can use



❏ This heavy snowfall effect uses multiple layers that help create the necessary depth and variety. The layers mean the effect is easily customisable

Axes. Save the settings by clicking the Create New Brush icon.

Add a new layer called **large flakes** and use the brush to paint in some white snow flakes. Set the layer Opacity to 65%, then select Filter > Blur > Gaussian Blur and set Radius to about 2.0. Duplicate this layer and scale it to about 50% (Edit > Transform > Scale). Using the Marquee Tool, [Ctrl/Cmd]+[Alt]-drag further copies to fill up the canvas space, then set the layer Opacity to 75%. The final stage involves selecting a few of the large flakes and copying these onto a new layer. Apply Gaussian Blur with Radius set to 9.5, then duplicate this layer. Flatten the two layers and position the flakes to suit. Select Filter > Blur > Motion Blur: set Angle to 72 and Distance to 5. You can apply motion blur to the other layers if you wish.



Richard Tilbury is the resident artist at 3D Total, and also runs a freelance business as a concept artist and illustrator
richardtilburyart.com

After Effects**"How can I create a tunnel effect like the Doctor Who title sequence?"**

Louise Smith, via email

Andy Davenport replies:

Start After Effects and create a new Composition. In the Composition Settings dialog, set Width to 600 px, Height to 2400 px, Frame Rate to 25 frames per second and Duration to 250 frames. Name the Composition **Tunnel Textures** and click OK.

Select Layer > New > Solid. Name it **Textures**, click the Make Comp Size button and click OK. With the solid selected, choose Effect > Noise & Grain > Turbulent Noise. Change Contrast to 220 and Brightness to -40 to break up the noise a bit. Click the Stopwatch icon next to Evolution to create a keyframe, then press [End] to take you to the last frame of the Comp. Change the Evolution amount to 3x +0.0°. Press [Home] to return to frame 0, then choose Effect > Blur & Sharpen > CC Vector Blur. Change Amount to 60 to distort the noise and achieve a nice swirling effect.

Now let's add some motion to the effect. Select Effect > Distort > Offset. Click the Stopwatch icon next to Shift Center To to create a keyframe, and change the settings to 300.0, 0.0. Go to the last frame and change the settings to 300.0, 1200.0. This controls the speed of travel down the tunnel: you've set it to move half the Comp's height (1,200 pixels) per second.

Create a new Composition. Change the name to **Tunnel Main**, then set Width to

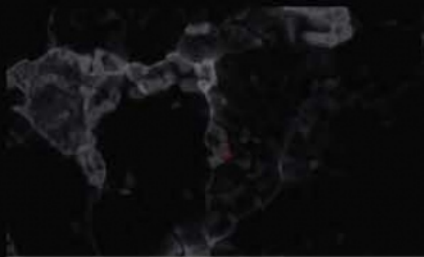
1024 px, Height to 576 px and Duration to 250. Drag the Tunnel Textures comp into the new Timeline and press [S] to bring up its Scale properties. Increase the setting to 176%. Now select Effect > Perspective > CC Cylinder. In the Rotation rollout, change Rotation X to 0x -90°.

Let's enhance the tunnel effect with Effect > Stylize > Glow. Change Glow Threshold to 0.0%, Glow Radius to 1.0 and Glow Colors to A & B Colors. Click the Color A swatch and change the colour to R 11, G 67, B 225. Similarly, change Color B to R 86, G 111, B 221. To hide the visible seam at the bottom of the tunnel, add Effect > Blur & Sharpen > CC Vector Blur. Change Type to Direction Center and Amount to 27.0.

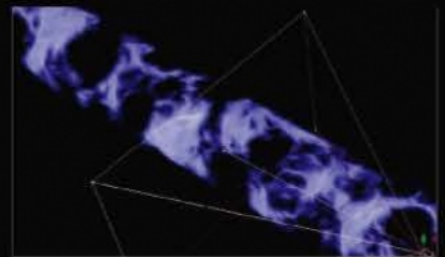
To finish the effect, select Layer > New > Camera. In the Camera Settings dialog, change Preset to 28mm. In the Timeline, press [R] to bring up the Camera's rotation properties. [Alt]-click on the Stopwatch next to X Rotation and type in the expression **wiggle(2,5)**. Do the same for Y and Z Rotation, but change the Z Rotation expression to **wiggle(1,20)**.



Andy Davenport is a motion graphics artist, 3D animator and compositor for the UK-based studio Mediastation
mediastation.co.uk



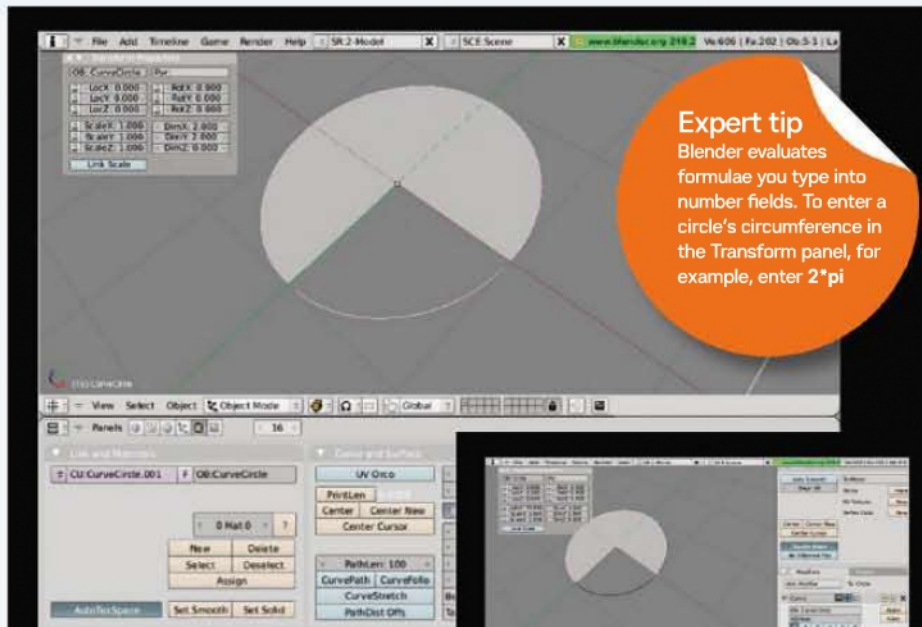
❏ A combination of Fractal Noise and CC Vector Blur creates an effective otherworldly look to the surface of your tunnel



❏ The tunnel is created by pre-composing the texture comp and applying CC Cylinder. Add a camera, and you can fly down the tunnel too



❏ A simple Wiggle expression applied to the camera's Rotation values adds a subtle shake



■ The basic clock-face swipe effect relies on a small triangular mesh that expands around a circular path defined by a Bézier curve

Blender "How do I create a circular swiping animated effect?"

TweakingKnobs,
from the forums

Bassam Kurdali replies:

In a new document, right-click the default cube to select it, then press [X] to delete it. Add a plane via [Shift]+[A] > Mesh > Plane and clear its location with [Alt]+[G]. In Edit mode [Tab], press [W] and select Subdivide.

In the Top view, press [Ctrl]+[Tab] and choose Faces. Select the top-left, bottom-left and bottom-right faces, then press [X] and choose Faces. Press [Ctrl]+[Tab] and select Vertices. Select the bottom-right vertex, then [Shift]-select the top-right vertex. Press [Alt]+[M] to merge the points and choose At Last. Press [G] and drag the selected vertex left until it's extremely close to its neighbour; press [Return] to confirm. Press [Ctrl]+[Tab] and choose Edges. Select the top edge. Press [W] and choose Subdivide Multi, then set Number of Cuts to 100.

[Tab] out of Edit mode. Press [Shift]+[A] and choose Add > Curve > Bézier Circle, then clear its location. In the Editing window [F9], turn on 3D and set DefResolu to 100. Select the original mesh. In the Editing window, click Add Modifier in the Modifiers panel and select Curve from the pop-up menu. Type the name of the curve circle (CurveCircle by default) in the Ob: field of the modifier. You'll notice that your pie slice jumps to the outer circumference of the circle... tut tut! Let's move it back: press

■ Create a repeating animation pattern in Blender's Ipo Curve Editor to establish the continual movement of the swipe effect

[G] then [Y], enter 1, then press [-] and [Return]. It should now occupy the interior instead of the exterior.

Switch the Buttons window to the Ipo Curve Editor. In the 3D View, scale the object down to zero in X with the key sequence [S], [X], 0 and [Return]. Press [I] to set a keyframe and select Scale. In the Ipo Curve Editor, go forward 20 frames by pressing the up arrow twice. In the 3D View, press [Alt]+[S] to clear the scale. Press [S] then [X] and set a value so that the edges barely meet: 100 did the trick for me, but it depends on the size of your mesh. When you're happy, press [I] and select Scale to key.

You now have one section of the animation done – but to make it cyclic, you have to get tricky! Let's do the scaling bit first: move forward another 20 frames, scale down to 0 again and key.

In the Ipo Curve Editor, select ScaleX. Press [E] and choose Cyclic Extrapolation, then press [T] and choose Linear. This will just ping-pong; to make it cyclic, you should also animate the location. Go to frame 1 and key Loc (the location value) in the 3D View, then go to frame 21 and key Loc again. At frame 41, move the object in X until it reaches its current point one rotation later; enter the value in LocX in the Transform panel [N], then set a Loc key. (See the tip for a shortcut for entering the correct value.)

In the Ipo Curve Editor, select the LocX curve, then give it Linear Interpolation and Cyclic-Extend Extrapolation.



Bassam Kurdali is the director of the first open-source movie, Elephants Dream. He's currently working on the short Tube tube.freefac.org

Cinema 4D "How can I freeze a simulation?"

S Cooper, via email

Anders Kjellberg replies:

You tell me that you have around 1,000 objects densely packed in a Cloner Object, with a dynamics tag for interaction. You need to freeze this simulation at an early stage, to get a sort of dynamic asteroid cluster. It's too bad that you're not using Cinema 4D R12: the Set Initial State function, introduced with the new dynamics system, would be perfect for your situation. However, what you are looking for can also be done with Cinema 4D R11.5 – it will just be a bit more destructive and take a few extra steps.

In Cinema 4D R11.5, open `asteroids_start.c4d` from this Q&A's project files, and press Play. The camera will slowly rotate around a Cloner Object with a Dynamics Body tag assigned. As the cloned cubes are so densely packed, they will all react dynamically to each other, resulting in a pretty violent explosion of objects. The first thing you need to do is to select Cloner Object in the Object Manager and add Tags > MoGraph Tags > MoGraph Cache. In Attributes' Tag Properties, click Bake to bake the simulation (it might take a few seconds, depending on your computer). Once the simulation is baked, you can scrub the Timeline to find a suitable frame; for this situation, frame 7 will be fine.

Next, select MoGraph > Fracture Object, then select the Cloner Object and select Functions > Make Editable. The result will be a new group called Cloner Object, with 1,000 individual cubes in it. Expand the Cloner Object group and select the first cube in the hierarchy. Scroll down and [Shift]-select the last cube, then drag the selected cubes to make them children of Fracture Object. Delete the now-empty

LightWave 3D "How can I create burning ash and debris effects?"

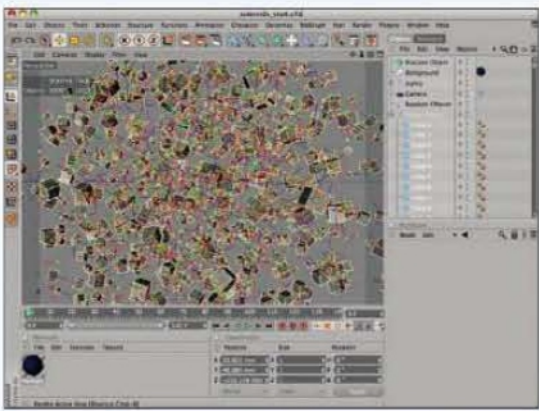
invalidal, from the forums

Eric Bacus replies:

Many digital artists make their living creating carnage and destruction, so being able to do so well provides you a valuable edge when being considered for work. When creating a raging inferno from scratch, attention to detail can really crank up the perceived intensity of the blaze. Beautiful, epic destruction begins to emerge with the addition of the tinier elements of the fire. This tutorial will show how to create an interesting element that could be used in a particle emitter.



Eric Bacus is a CG artist at Branit VFX. His resume includes many primetime shows, notably *Lost*, *FlashForward* and *Breaking Bad* ericbacus.com



By adding a MoGraph Cache tag to the Fracture Object, you can bake the simulation, then make it editable

Each individual cube reacts to other dynamic bodies in your scene, opening up very interesting scenarios



Expert tip

To give the cubes more life, select the Fracture object, add a Random effector and animate the Rotation values as you like

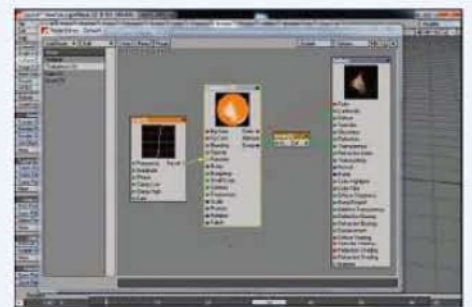
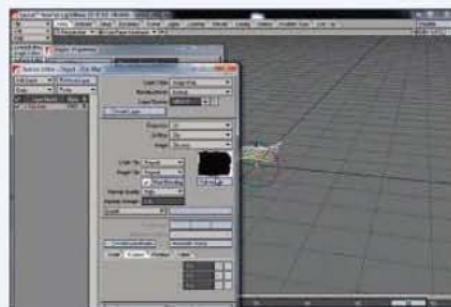
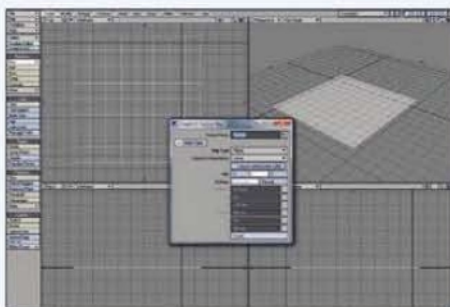
Cloner Object group and the Random effector: you won't be needing them anymore. Select Fracture Object then choose Tags > MoGraph Tags > Rigid Body. In the tag's Dynamics tab, set Trigger to On Collision.

Now choose Objects > Primitives > Sphere; set its Radius to 600 m. Create a second MoGraph Fracture

Object and make the Sphere a child of it. Select the Fracture Object and move it above the cloud of cubes in the Y axis. Give it a Tags > MoGraph Tags > Rigid Body tag. Also create a Material Manager > File > New Material, make it red and assign it to the Sphere. Now press Play and watch as the sphere plows its way through the cubes!



Anders Kjellberg is a freelance 3D artist living in Sweden. He produces work for both printed and broadcast media
dogday-design.se



01 Making the object

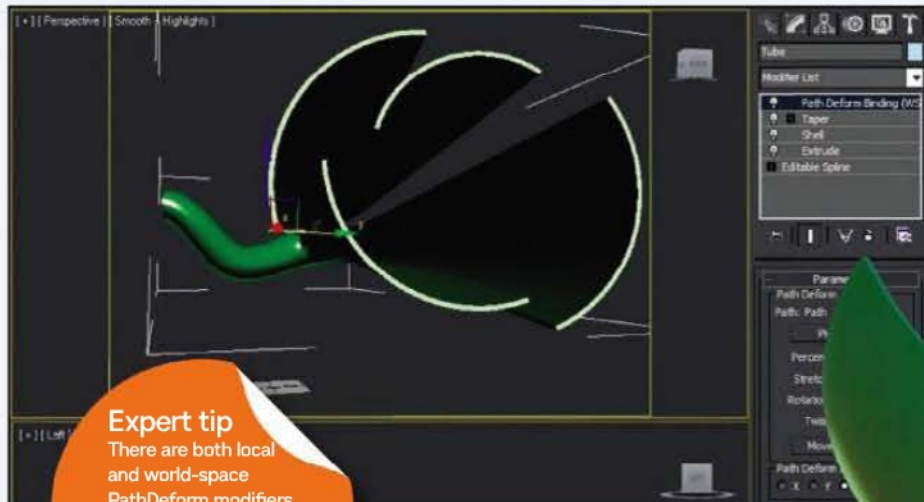
Start in Modeler. Select Create tab > Box and draw a polygon with enough segments to facilitate deformation later. The further from the fire the camera sits, the less detail the object should have. In the bottom-right of the screen, click T then use the drop-down menu to select (new) to make a UV map. Set Map type to Planar and Axis to Y, then click Create. This UV map will be used in conjunction with a black-and-white 'edge' map that you'll create in an image editing program such as Photoshop. You can clone or manipulate your object as you see fit. Save your object and send it to Layout. In Layout, select your object and press [P] for Properties. In the Deform tab, enable a Displacement map.

02 Deformations and Clip Maps

Choose a procedural-like turbulence and animate the position of the texture in Y to create a drifting effect. Once you're satisfied with the motion of the debris and the outline, you're ready to move onto surfacing. In your favourite image editing software, create a black irregular shape nearly filling the frame on a canvas of 256x256 px, and save it as a PNG in your scene's images directory. Use this as a Clip in your UV map. Next, find the material of the debris you'd like to use; a newspaper provides an interesting bit of detail, for example. Switching back to Layout, open the Surface Editor and click Edit Nodes. Select Add Node > 3D Textures > Turbulence. In the node options, increase Frequencies to 8.

03 Create an animated texture

Select Add Node > Functions > Gain. Plug Gain's Result output into Turbulence's Function input. In the node options, set Gain to 0.9999; this will cause the turbulent texture to increase in contrast, but keep a nice edge for embers. Click E next to Phase to open the Graph Editor. Make a keyframe of 0.5 at frame 0, and a keyframe of -0.5 at the end of your timeline. The function will drive the turbulence layer to fill in gradually, simulating ash burning away. Create a Math > Scaler > Invert node and plug Turbulence's Alpha into its Input. Plug Invert's output into Surface's Transparency and Luminosity, and the Color output into the Color input. Set your Turbulence colours to a suitably orange hue.

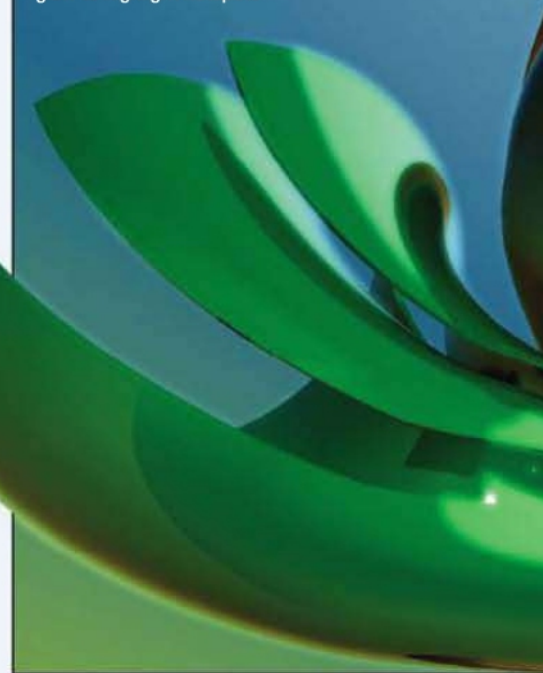


Expert tip

There are both local and world-space PathDeform modifiers. If you want to add modifiers on top of PathDeform, use the local modifier

■ Rather than relying on a Loft operation, this animated tube effect uses the PathDeform modifier, adjusted via Extrude and Taper

■ The final render uses reflective material, along with a simple glow to highlight hotspots



3ds Max

"How can I create extruding tubes for motion graphics?"

Mike James Meara, via email

Michael McCarthy replies:

With all the motion graphics work flying around lately, I find that more 3ds Max users have questions about how to do the latest effects. While 3ds Max doesn't have as many automated ways to do these things as some packages, it does have tools that make it very flexible and easy to achieve these effects.

There are a few ways to animate extruded blocks, ribbons or beams. One method is to use a Loft operation: once you've lofted the shape, you can animate the deformation curves such as Scale and Twist to get an animated, lofted surface. Another option is to use PathDeform. I prefer this option, since I like to use the power and flexibility of the Modifier stack.

Open TubesStart_2010.max, included in this Q&A's project files. The scene has two spline objects: Path and Tube. Select the Tube object and add an Extrude modifier to it. Set Amount to 280 and Segments to 70, to give the mesh enough height and density to deform properly.

Next, add a PathDeform (WSM) modifier. Click the Pick Path button and choose the Path object in the scene. Click the Move to Path button to make sure the object is in the same position as the Path object.

If you adjust values like Percent and Stretch, you can see the form move or stretch along the spline. Set Stretch to 0. Move the time slider to frame 100 and turn on Auto Key, then set Stretch to 5. Now the extruded tube starts to grow along the path.

To add to this effect, you can add deformation modifiers to the Tube object, such as Taper or Twist. With the Tube object selected, add a Taper modifier. Adjust Amount and Curve to make the tubes either wider or narrower at the leading edge.

Since the PathDeform modifier is a World Space modifier, it stays at the top of the Modifier stack. This means that any deformations done to the Tube

Softimage

"How do I use render channels?"

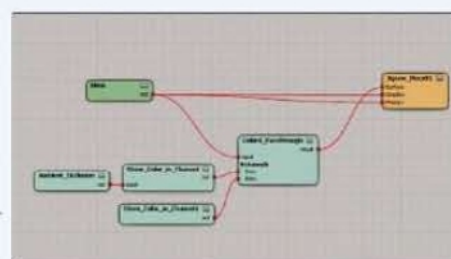
Alain, via email

Ola Madsen replies:

The typical use of render channels is to render the scene components, such as diffuse, reflection or motion vectors, as individual images. As most of these components are already calculated individually by mental ray, they're not going to affect the time needed to render the image. In addition, channels can be used to render partial or multiple render trees, adding ambient occlusion, outputting mattes or any other type of information within a single pass.



Ola Madsen is a Softimage Certified Instructor. He currently works as a 3D artist at Digital Context in Sweden
caffeineabuse.blogspot.com



01 Adding the channel

Open Render_Channels.scn from this Q&A's project files. Select the Jigsaw_Piece_01 object and press [7] to open a Render Tree. Get a Store Color in Channel node and open its PPG. This node can be inserted anywhere in your render tree, to store a specific part of the tree to custom-render to a channel; but it can also be used to store information that isn't part of the actual material. Under Render Channel, expand the drop-down menu and choose AmbOcc. Get an Ambient Occlusion node and connect it to the Input of the Store Color in Channel node. (The latter is hidden until you drag a connection onto the node.)



02 Store the information

Get another Store Color in Channel node. In the PPG, click Add and enter RGB_Matte as the Render Channel Name. Set the Input swatch to pure red. Get a Color4_Passthrough node and connect the Blinn node to its Input. Connect Color4_Passthrough's Result output to the Surface input of the Jigsaw_Piece01 node. The Passthrough node acts as a hub, enabling you to store as many channels as you like. Open its PPG and click Add twice to add two channels. Close the PPG and connect each of the Store Color in Channel nodes to a channel's > Item input.



object will happen before the path deformation. You can animate elements such as Taper or Twist amounts to build more interesting effects. Another thing you can do is to add a Shell modifier just above Extrude in the stack. This gives the Tube mesh some thickness, which can make it interesting for rendering as glass or with reflective material properties.

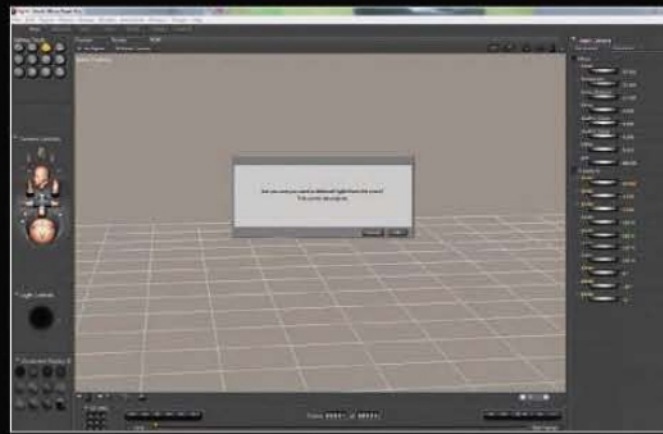


Michael McCarthy is a 3D artist and Autodesk Certified Instructor working in broadcast, feature film and games
mmccarthy.com



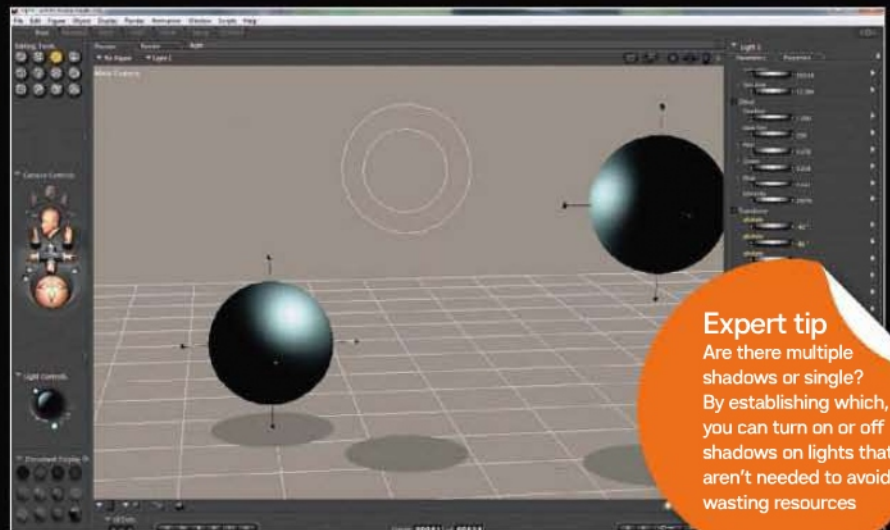
03 Render the channels

Repeat the procedure for the other jigsaw pieces, but set the Input for the RGB_Matte channel to pure blue for the second piece, pure green for the third and pure black for the fourth. Close the Render Tree. Select Render > Render > Render Manager. In the Render Channels Output section, click Add. Select the AmbOcc channel in the drop-down menu and click OK. Click the Add button again, select the RGB_Matte channel and click OK. Your pass is now ready for rendering, so click the Render button and choose Render Current Frame.



Use Poser's deleteLights script to clear your scene from light presets

A Point light is the preferred option for making naturalistic outdoor effects



Expert tip

Are there multiple shadows or single? By establishing which, you can turn on or off shadows on lights that aren't needed to avoid wasting resources

Poser "Why do I keep losing my lights?" Mike Rodriguez, via email

Brian Haberlin replies:

It's happened many times to many Poser users: you add a light, yet can't find it anywhere in your scene. But there are tricks for using, finding and positioning lights that are deadline life-savers... I'll show you a few.

Start a new scene. If you've kept the default settings in Poser, it will load three Infinite shadow-casting lights: delete them. (You can do this quickly via Scripts > Utility > deleteLights.) By starting with one light, it's a lot easier to fine-tune its settings without being confused by the other lights. Next, bring in the Ball from Props/Primitives in the standard Poser library. Add another, and move it up and to the right so you can see your light manipulations better.

Under Light Controls, click the Create Light icon: Poser adds a Spot light by default. Generally, the light will come in pointing towards the middle of the ground plane grid. But the light itself does not come in at the centre of the scene. This isn't a problem in a

simple scene, but it can become quite a pain if you are trying to light a complex scene. To find a 'missing' light, select it from the scene list, then zero out xTran, yTran and zTran in Parameters. It will go to the centre of the ground grid; from there, it's easy to place it wherever you want.

Since I usually reproduce natural settings in my work, I switch the light to a Point light in the Properties tab; in Parameters, I scale up its icon so it's easier to see. To move it, I primarily use the Translate/Pull tool. If you hold [Ctrl/Cmd] with this tool active, it will change to Translate In/Out, which makes it easy to move the light.

The Preview viewport enables you to see where the light is hitting the objects and its falloff. From there, you can make a pretty accurate guess of where your shadows will go when rendered.

Another great tool to consider for moving lights or props is SnapTo, a free Python script from ockhamsbungalow.com/Python. It enables you to select your light then click on any prop or body part to make the light move there – great if you are putting lights in a hallway ceiling, for example. ●



Brian Haberlin is an illustrator and comic artist. He teaches at Minneapolis College of Art and Design and produces tutorials digitalarttutorials.com

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3D WORLD *Reviews*

Software
Natural
environment
creation

PRICE

Vue 9 xStream
• £1,132 / \$1,495 /
€1,250
Vue 9 Infinite
• £753 / \$995 / €831

PLATFORM

Windows / Mac

MAIN FEATURES

- Relighting
- Improved terrain modelling/painting
- Parameter publishing
- HyperBlobs
- Flicker reduction

DEVELOPER

e-on software

WEBSITE

e-onsoftware.com



■ Terrain paint brushes have been organised into a Photoshop-style library with the ability to modify and save your own brushes

■ The new Rocky Mountain algorithm is quite possibly the most powerful and flexible terrain fractal in Vue to date

Vue 9

As reliably as ever, version 9 of the venerable environment/vegetation/atmosphere 3D modeller and renderer swings around. **Eran Dinur** looks at the improvements

Let's start with some good news for Mac users: Vue 9 comes rebuilt ("from the ground up" according to e-on) as a 64-bit native Cocoa application that equals its Windows counterpart in speed and stability. So if you're running Vue on Mac, it seems like version 9 is a must-have upgrade regardless of other features. But what about Windows users – how much does this update offer compared to Vue 8.5?

Firstly, Vue's interface has been redesigned with softer grey colours, new icons and buttons, giving it a stylish, up-to-date look and a comfortable feel overall. This is more than just a facelift though; some buttons have been re-organised in a more logical fashion. A handy Randomize button has been added to fractal terrains, materials and clouds, and the base grid is now infinitely adaptive, with a scale ruler in each window. Also, measurements are now standardised across the board as real world units and degrees, making work in Vue more coherent.

Surprisingly, a few rather archaic aspects of the interface have been left unchanged. The numerics tab, for instance, still displays rotation as pitch, yaw and roll, and the colour editor remains modal, which can be a problem when using the new relighting tool.

SELF PUBLISHING

By far the most significant new interface feature in Vue 9 is the ability to pull out (or 'publish') any parameter from the function editor and create your own customisable control panels in the terrain and material editors. Without the need to jump back and forth between the function editor and other windows, editing complex procedural terrains and materials becomes much more fast and fluid. Published material parameters have their own animation curves, which allows for much more precise material animation.

The last couple of versions brought substantial enhancements to terrain modelling, and Vue 9 continues this

trend with more features and improved workflow. Terrain paintbrushes have been re-organised into a Photoshop-style library with the ability to modify and save your own brushes with a dedicated brush editor. This editor includes some very useful additions such as the much-needed ability to control the subdivision resolution for image-driven brushes, and the option to control brush behaviour with environment rules. For example, you can now paint snow where you want it while still having it appear only on flat areas. To further facilitate terrain painting, a separate 'freeze mask' can be layered in at any time to protect areas from being painted, and a new Smear brush comes in handy for shifting large chunks of terrain without destroying small detail.

Vue 9 also comes with a new terrain algorithm, the Rocky Mountain fractal – quite possibly the most powerful and flexible terrain fractal to date. It can be used on its own, to create sharp-ridged, highly detailed alpine mountains, or mixed with a Terrain fractal for instance, to add rocky outcrops, stones or scree. Like



About the author
Eran Dinur is compositing supervisor at Brainstorm Digital and the Vue instructor at fxphd. Previously he was senior compositor at Framestore NY and ILM Singapore. His film credits include Transformers 2, Iron Man, Star Trek, Terminator Salvation, Clash of the Titans and Salt
cgauw.com



■ HyperBlobs are remarkably suitable for creating highly complex, resolution-independent rock formations



■ With Parameter Publishing, you can create your own control panels and speed up workflow substantially

other fractal algorithms, it's not easy to master but it packs a lot of power and can generate a surprising diversity of terrains. Another very useful addition to the Terrain Editor is the ability to extend a fractal terrain, rather than just rescaling it.

RELIGHT AND RETOPOLOGIZE

The new Retopologize function automatically rebuilds the mesh of standard terrains, attempting to correct bad topology that results from drastic sculpting or stretching. The Looseness parameter lets you define the amount of mesh relaxation, but even at minimum settings there's a considerable amount

the scene and changing the sun's intensity and colour immediately changes the appearance of the sky, which consequently affects the ambient light. It all works quite beautifully, making relighting a great tool for quickly generating different looks out of a single render. What's currently missing is a separate slider to control the indirect lighting contribution.

HyperBlobs are not an entirely new technology, but rather a marriage between the two existing Vue features of MetaBlobs and HyperTextures – albeit with enhanced controls and functionality. It's now possible to add displacement on top of the HyperTexture material,

“By far the most significant new interface feature in Vue 9 is the ability to ‘publish’ any parameter from the function editor”

of smoothing that destroys small-scale detail. This limits the usefulness of the Retopologize tool, especially since you cannot apply erosion and effects to retopologised terrains.

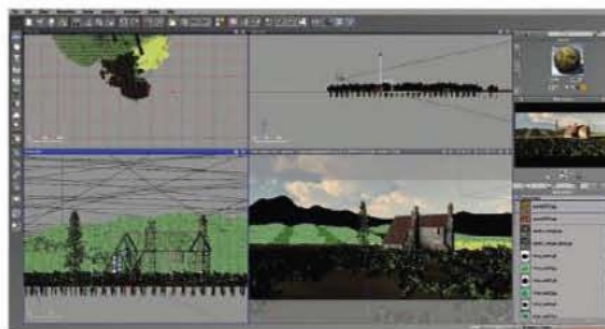
Relighting lets you tweak the intensity and colour of multiple lights as a post-render real-time process. Vue's lighting paradigm has always been based on a single light source – the sun – so in order to fully use the potential of relighting, a shift from the one-light paradigm is necessary. With the help of the Influence Editor, you can restrict the main sunlight to the sky alone, add a second sun for extra light on the clouds, a third for the actual scene, add localised and ambient lights, and then fine-tune with relighting.

Vue's relighting is derived from the actual raytraced render. This means that tweaking a light realistically affects shadows, reflections and refractions across

control the subdivision amount and cut out floating, unconnected bits. All this makes HyperBlobs remarkably suitable for creating highly complex, resolution-independent rock formations.

However, like fractal terrains, they are not very intuitive, and take time to calculate and render. It's not possible to export HyperBlobs or convert them into simple meshes. While they can be a great modelling tool for large-scale features, HyperBlobs aren't very suitable for use in EcoSystems, for example. Therefore, a preset-based SolidGrowth-style rock generator is still high on our wish list.

One of the major points of criticism toward Vue has been the flickering that often occurs in animations with dense EcoSystems. According to e-on, flicker reduction in Vue 9 isn't an additional feature, but rather an internal improvement in plant rendering, so it's not selectable



or user-controlled. Our tests showed that while flickering hasn't completely gone, it is considerably less obvious than in Vue 8.5, without any noticeable blurring or loss of detail.

So while Vue 9 doesn't deliver anything major such as a new plant editor or rock generator, it does offer some exciting features like relighting and the Rocky Mountain fractal that open up new creative possibilities, together with substantial workflow enhancements. ■

■ The redesigned interface has a stylish, up-to-date look and a more comfortable feel

3D VERDICT

PROS

- New terrain modelling and painting tools
- Relighting is useful
- More customisable controls
- Rewritten 64-bit OSX version

CONS

- No improvement to rock generator
- No ambient relighting control
- Limited Retopologize

A solid and very worthwhile upgrade for any serious Vue artist – and for Mac users in particular



PRICE
 • £599 / \$934 / €705
 Upgrade from V1.x
 • £299 / \$466 / €352

PLATFORM
 Windows

MAIN FEATURES

- Creates bespoke HDR images quickly
- Powerful but intuitive and simple interface
- Live preview of illumination and reflection
- Includes many lights, all fully editable
- Integrated mental ray workflow

DEVELOPER
 Lightmap

WEBSITE
lightmap.co.uk



If you want very precise positioning of HDR illumination, Light Studio could be just the app you've been looking for



HDR Light Studio 2.0 Pro

Creating your own HDR maps has always been a specialist field. HDR Light Studio aims to change that, as **Paul Beards** explains

Given that HDR lighting is the preferred method of producing 3D imagery with realistic (and relatively fast) renders, there seems to be remarkably few applications that enable you to produce your own. Most of the HDR market is populated by ready-made HDR images, and while for the most part these are reasonably priced, wouldn't it be better to be able to produce your own unique lighting, quickly and interactively? HDR Light Studio is one application that lets you do just that, and with this new version 2.0, creating these maps has become even quicker and more intuitive.

VIRTUAL STUDIO

In its most basic terms, HDR Light Studio (HDRLS) is exactly what the name implies: a virtual studio for setting up a bespoke light rig that can be saved for later editing, or rendered out at your desired resolution in your preferred file format. Included are a wealth of different light sources, from basic shapes to realistic-looking soft boxes, all of which are fully editable

to give maximum control over your final HDRI. This latest version adds the new Livelight window, where you can import your model in either .mi or .obj format to preview exactly how the HDRI will affect both the lighting and reflections in your final scene. Once the light rig is complete, it can be rendered quickly to a HDR format and then imported into your 3D application of choice.

When first launched, HDR Light Studio presents you with a main HDR workspace (which can be viewed in two different ways) in which to place and edit your various light sources, as well as the option to use either a solid background, a gradient or an existing image as a starting point for your light rig. Applying lights is as easy as selecting one of the basic shapes in the top menu bar, or by double-clicking any of the 'picture lights' from the pop up menu. All placed lights appear in the main window as a list, and each can be selected and edited individually.

Editing options start with simple scale and rotate tools, but also include options

such as moving the light centre, the falloff and changing the illumination style. Once you get to grips with the editing tools, it becomes clear that pretty much any style and shape of light can be created with just a few simple and obvious clicks.

INTO THE LIVELIGHT

The uncluttered and seemingly bare-bones layout of the main workspace is deceptively powerful, and with just a small amount of guidance (via supplied tutorial videos), you'll be creating effective HDR images in minutes. While HDRLS is seemingly aimed at users who wish to create 'studio' lightmaps, using a photograph as a backdrop and being more creative with the light settings could see you producing interior or outdoor HDR images as well.

The second window presents the biggest and most obvious upgrade from the previous versions, and also transforms the application from the status of 'handy curiosity' to 'near essential'. Called Livelight, this gives the option to



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 Paul Beards is a senior illustrator for Dyson, where he has been for the last six years.

A modio enthusiast, you can often find him on the Luxology forums under the username of Sumimasen
web.me.com/paul.beards



preview your scene or model in Reflection, Illumination or Combined modes (selectable via tabs in the Livelight options window), which really helps to fine-tune your HDRI and judge accurately where to place flood and key lights. The reflection in Livelight appears as a fully glossy material by default, but can be made more satin simply by toggling a button. While this change affects your model globally, it is very useful for determining how the HDRI will affect different material types. The Livelight window uses CPU power rather than GPU, so HDRLS should work well on a wider range of machines, albeit Windows boxes only.

If this all sounds like a perfect solution to creating new and interesting HDR images, you wouldn't be far from the truth, but as with everything there are a few issues that stop this from being the perfect package. First of all, Lightmap says that while .obj files can be used, mental images .mi files are the preferred format to import into HDR Light Studio. At first I wasn't sure how much impact this would actually have to non-mental ray users, but after trying both formats, the advantages of using a .mi file over .obj are clear. The .mi file keeps all of the camera information intact when used with HDRLS, which means that the model appears in

the preview window exactly as it would in whichever mental ray-compliant package you used to originally create it.

Using .obj – which, being an object-only format, cannot carry any camera data – forces you to try to position the model in the window using the HDRLS viewport navigation tools, which are cumbersome to say the least. Also, .mi files that contain subdivided objects show in the preview window correctly, whereas .obj files import as basic polygons, with no option to apply subdivision. Materials are not imported using either the .mi or .obj formats, which is fine, as the idea is purely to get an accurate general representation of the illumination and reflections emitted by the HDRI. Of course, once the HDR image itself is rendered, it can be used with any 3D package.

MORE, PLEASE

HDR Light Studio is undoubtedly a great package, combining an easy-to-use but powerful interface with a speedy and accurate preview system that makes creating high dynamic range light rigs a breeze. Version 2.0 makes good on the potential hinted at in version 1.5, but there is certainly further room for improvement in the next release.

If HDRLS added compatibility with

more 3D scene formats, I could see this package becoming indispensable in many, many studios. By essentially limiting its smoothest workflow functionality to mental ray users, Lightmap is also potentially limiting the client base. The app is also fairly expensive, almost costing as much as some full 3D suites.

That said, if you have a mental ray-integrated 3D package, or can otherwise work around the shortcomings of using .obj files, this stylish and powerful application comes with the highest of our recommendations. ■

■ The 'Combined' image in HDRLS (far left), with corresponding Illumination and Reflection views



■ There are plenty of presets to alter if you don't want to start from scratch

3D VERDICT

PROS

- Simple, intuitive interface
- Surprisingly powerful
- Large light library

CONS

- Windows only
- Patchy .obj compatibility
- Fairly expensive

A great little application that is fast and simple yet deceptively powerful. Limited compatibility with non-mental ray scenes might limit its value for some people



Original HDRI and backdrop by mcofe.com, 3D model by pk3d.com

Image by Bryan Sola

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PLATFORM

Windows / Mac

MAIN FEATURES

- Plant generation
- Parametric, based on real plants and trees
- Terrain import in OnyxGrass
- Extensive plant library
- Billboarding

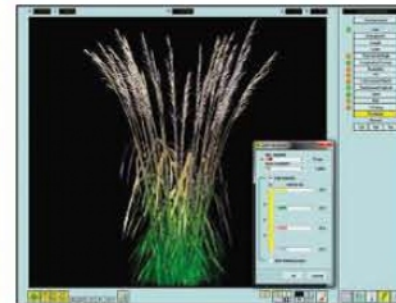
DEVELOPER

Onyx Computing

WEBSITE

onyxtree.com

■ Garden Suite's main improvements in this release focus on increased grass and flower density functionality, in addition to terrain import and export



Onyx Garden Suite 2.1

With new terrain import and billboarding features, Onyx Computing's Garden Suite is one of the better vegetation generator options on the market, says **Cirstyn Bech-Yagher**

Something of a veteran in the field of plant-generation software, Onyx Computing is currently celebrating its 18th birthday. Its vegetation plug-in, TREESTORM for 3DS Max, and standalone parametric vegetation generators OnyxFlower, Palm, Bamboo, Conifer, Broadleaf, Grass and Onyx2Max – collectively known as the Garden Suite – are some of the most accurate generators on the market, and have been staples with architects, matte artists and 3D generalists alike for years.

The overall improvements in this release are of the useful but somewhat invisible kind: proper 64-bit addressing speeds up an already lightning fast application on 64-bit platforms. The new offscreen drawing option may be faster on some systems, and all applications can now save to the ONX format, enabling the files to be opened natively in Max. OnyxGrass and

OnyxFlower are the applications getting a functionality boost this time around; for example OnyxGrass, currently in its second incarnation, can now populate triangulated imported terrains with grasses and export them again. This feature saves time and hassle, in addition to allowing you to generate a unique population for that specific terrain, something few standalone vegetation modellers let you do (for example SpeedTree – see page 102).

GRASS ROOTS

In addition, OnyxGrass finally has an option to use multimaterials, facilitating greater variety in the textures, which should make it a lot easier to generate a varied look in your ground covers.

You can now simplify most plant components from stem to stamen via billboarding through alpha plane crosses and rectangles, thereby significantly reducing the polycount in the grasses and flowers generated – ranging from a very high density model to almost Vue-like billboarded plants in composition. This new functionality, also implemented in OnyxFlower, solves a gripe many users have had about the Garden Suite's meshes being too dense for complex scenes.

While not a major release, Onyx Garden Suite 2.1 is solid enough. However, there are some things which would have taken it to the next level. Even though the renderer is lightning fast, it would have helped if one could hook up to an external renderer

to see photoreal output in real-time, without having to go the save/export/reload route. In addition, it would be useful to have generic views such as top, bottom, front and so on implemented, as dragging your mouse all the time can get cumbersome, especially when working with the imported terrains.

Having said that, the Garden Suite is a very viable alternative to standalone Xfrog 3.5. Newcomers to plant generation are eased into creating realistic plants via extensive documentation, with hundreds of plants to practice on – and if you're an experienced user, you'll appreciate the increase in speed, the UI tweaks, and ability to define your mesh density. ■

3D VERDICT

PROS

- Increased speed
- Billboarding facilities
- Terrain import/export

CONS

- Can't share generated meshes
- No view panes
- Easier with mouse than tablet

Fast, easy, with an extensive library and documentation – Garden Suite's new features provide a lot of bang for your buck



■ OnyxGrass' new terrain import function means you can populate objects with grass or grass alphas



About the author
Cirstyn Bech-Yagher is a long time freelancing all-rounder, doing anything from project management to modelling and texturing
northern-studios.com



PRICE
• £3,214 / \$4,995 /
€3,815

PLATFORM
Windows / Mac

MAIN FEATURES

- Hand-drawn trunks and branches
- World building directly in the modeller
- Mesh forces
- Object collision using PhysX engine
- Extensive library of trees and texture maps

DEVELOPER
SpeedTree

WEBSITE
speedtree.com



SpeedTree Cinema 5.2 is a middleware vegetation generator actually living up to its promises: more, better trees – faster

SpeedTree vegetation natively supports the placement of exportable bones and their controls, and promises increased functionality in future releases



SpeedTree Cinema 5.2

Probably the most feature-rich vegetation software available... but also the most expensive, says **Cirstyn Bech-Yagher**

Probably best known for its lightning rise to become the vegetation standard for games since its initial release of SpeedTreeMAX/RT in 2002/2003, SpeedTree's parent company IDV has now unleashed SpeedTree Cinema 5.2. A VFX middleware vegetation generator, Cinema is aimed at studio VFX artists and matte painters. Licensed among others by ILM, the set of applications is based on a fully re-engineered build of the SpeedTree 5.0 kit, and comes, like the game version, with modeller, compiler, SDK, 3ds Max macros, and the full SpeedTree library and textures.

Looking first at the modeller, one of the biggest stand-outs is the ridiculous ease with which you can do things. Take generating a tree, for instance. Whereas the Onyx workflow lets you generate a tree parameter by parameter, or standalone Xfrog (which hasn't been updated in years) lets you work with splines, primitives and tropisms, one of the ways SpeedTree Cinema lets you build your tree is by simply pressing Space and then drawing with your pen or mouse. The subsequent output can then be controlled and tweaked via control points, instead of splines, and you can draw your tree with predefined textures and behaviours.

DENSE UNDERGROWTH

The ability to do this is another of SpeedTree Cinema's strong points. Whereas the template workflow in other apps typically is to load a tree and then tweak or snag its parameters, SpeedTree Cinema lets you define the model's

parameters beforehand, using zones and generators, which you hook up to each other a little like you do with components in Xfrog. This makes it very easy and fast to draw unique (and very dense) vegetation or populations.

With a UI somewhat reminiscent of Xfrog or Arbaro with all its parameter input fields, you'll find everything but the kitchen sink when you start working with your vegetation. There's a massive timesaver in the ability to procedurally populate world building sets, complete with masking functions. Another big timesaver is what SpeedTree calls mesh forces. This enables vegetation to interact with imported objects, by growing around, through, in, over, or under them – whether it's a bonsai in a teapot or a tree growing around a well or ruined wall.

NOT QUITE PERFECT

Mesh forces is not a function implemented in the other, current standalone vegetation generators on the market. Add to that the ability to bone trees and use collision objects in-app, and you essentially have a modelling tool armed to its teeth.

We did, however, experience a few problems; there were freezes and hangs when working on trees of various complexity, in addition to some export failures which were hard to pinpoint. The main gripe anyone not working in a studio or possessing a pipeline will have with SpeedTree Cinema is simply its price. As middleware, with no intent of hitting the consumer market, it is, alas, an application out of the reach of most artists. ■



You can build templates by defining generators and parameters in zones, enabling fast, accurate vegetation generation fairly easily

3D VERDICT

PROS

- Hand-drawn splines for generation
- Lightning fast
- Easy to use

CONS

- Prohibitive pricing
- No reduced package for solo artists
- Some export problems

If you can afford it, SpeedTree Cinema will definitely take your vegetation work to a new level. If not, OnyxTree's products offer some of the same functionality for less



About the author
Cirstyn Bech-Yagher is a long-time freelancing all-rounder, doing anything from project management to modelling, rigging and texturing
northern-studios.com

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MAIN FEATURES

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MANUFACTURER

Apple Inc.

WEBSITE

apple.com

■ Twelve cores make for a real monster of a machine, with a price to match



■ As ever, the ports are neatly arranged in a somewhat less than thrilling display of minimalism

Apple Mac Pro

Apple's latest workstation upgrade brings power and performance, but at a premium price. **Steve Jarratt** tests its CG credentials

Apple's latest top-of-the-range machine is a real powerhouse. Alongside the dual- and quad-core variants, the Mac Pro can also be specced with the latest six-core chips, delivering up to 12 real and 24 virtual threads of rendering power. Despite using two threads running on the same core, you'll still gain a 15-30 percent performance boost over non-Hyper-Threaded systems.

As well as being hugely expandable in terms of memory (32GB) and storage (8TB), the Mac Pro is notable for having its CPUs and RAM on separate, removable daughterboards, which presents the distinct possibility of a future processor upgrade. Plus, for the first time Apple offers a solid-state hard drive as a build-to-order option providing up to 223MB/s read, 171MB/s write speeds, which is ideal if you do a lot of heavy-duty video work.

The top-of-the-range machine on test weighs in at a whopping £6,780, but you can easily reduce that to £5,065 by dropping to the ATI HD 5770, removing the aforementioned SSD and selecting only 6GB of RAM. Apple-supplied RAM is notoriously expensive – an additional 6GB can be bought separately for around £100 rather than the £360 quoted on Apple's store. If this is still too rich, dropping to

the 2.66GHz version lops a further £981 off the price to 'just' £4,084, even taking into account the new VAT rate.

The price might not look too appealing, but in comparison to similarly specced build-to-order PCs from the likes of Boxx or Cerise, it's actually pretty competitive.

TAKE A HIKE

If you've just bought the latest 8-core Mac Pro, then this model will only deliver a 30-50 percent speed gain and probably won't be of much interest. But if your Mac is a generation or two older, then the 12-core promises to give you a serious performance hike. In comparison to a 2008 dual 2.8GHz quad-core Harpertown system – which was a near top-of-the-line system two years ago – moho benchmark scenes rendered anywhere from 80 percent faster right up to 170 percent faster: nearly three times as fast. Likewise, complex, high-res LightWave scenes were delivered in half the time.

Cinebench 11.5 returned a render score of 15.06, which puts it only a shade below PCs running 3.33GHz Xeon 5680s. However the OpenGL score of 31.5 is disappointing, falling short of lower-priced systems running ATI's cheaper 5770 or even the older 4850 cards, and once

again highlighting Apple's bewilderingly lacklustre OpenGL support.

Still, the sheer number of available threads means that interactive previews update incredibly quickly; in small preview windows, you're often getting a real-time preview at near-final output quality. Likewise, apps that use multi-core well, such as sculpting and fluid or hard-body simulations, will also benefit hugely. Make no mistake, 12-core systems, Mac or PC, are absolute beasts when it comes to CG tasks that employ multi-threaded apps. And despite all the heavy iron on board, the Mac Pro is still whisper quiet. ■

3D WORLD VERDICT

PROS

- Incredible performance with multi-threaded apps
- Hugely expandable, easily accessible
- Great build quality

CONS

- Relatively poor OpenGL performance
- Hefty price
- No 3.33GHz option available

CG is one of the few areas that can genuinely use a 12-core machine, and if performance is a higher priority than budget, this monster is really tempting



About the author
Steve Jarratt has been reviewing creative CG software since the early days of 3D World, and now he has the unique pleasure of being its esteemed editor
3dworldmag.com

Post Production

Key moments
in CG history
revisited

Debrief

Studios look back
on the highs and
lows of recent
commercial jobs

Blend in to stand out

Taylor James' latest spot for Citrix features a remarkably realistic CG chameleon married with live action, says the production agency's creative lead Alex Pickup

VITAL STATISTICS
Agency Young and Rubicam, San Francisco
Title Citrix Systems Inc. Chameleon
Format Broadcast commercial
Release date December 2010
Client Citrix Systems Inc.
Production Taylor James
Software used ZBrush, 3ds Max, CAT, V-Ray, Photoshop



About the author
Alex Pickup began his career as a freelancer, following his love of photography and retouching. He began working at Taylor James in 2006 on a permanent basis where he is now one of their creative leads
taylorjames.com

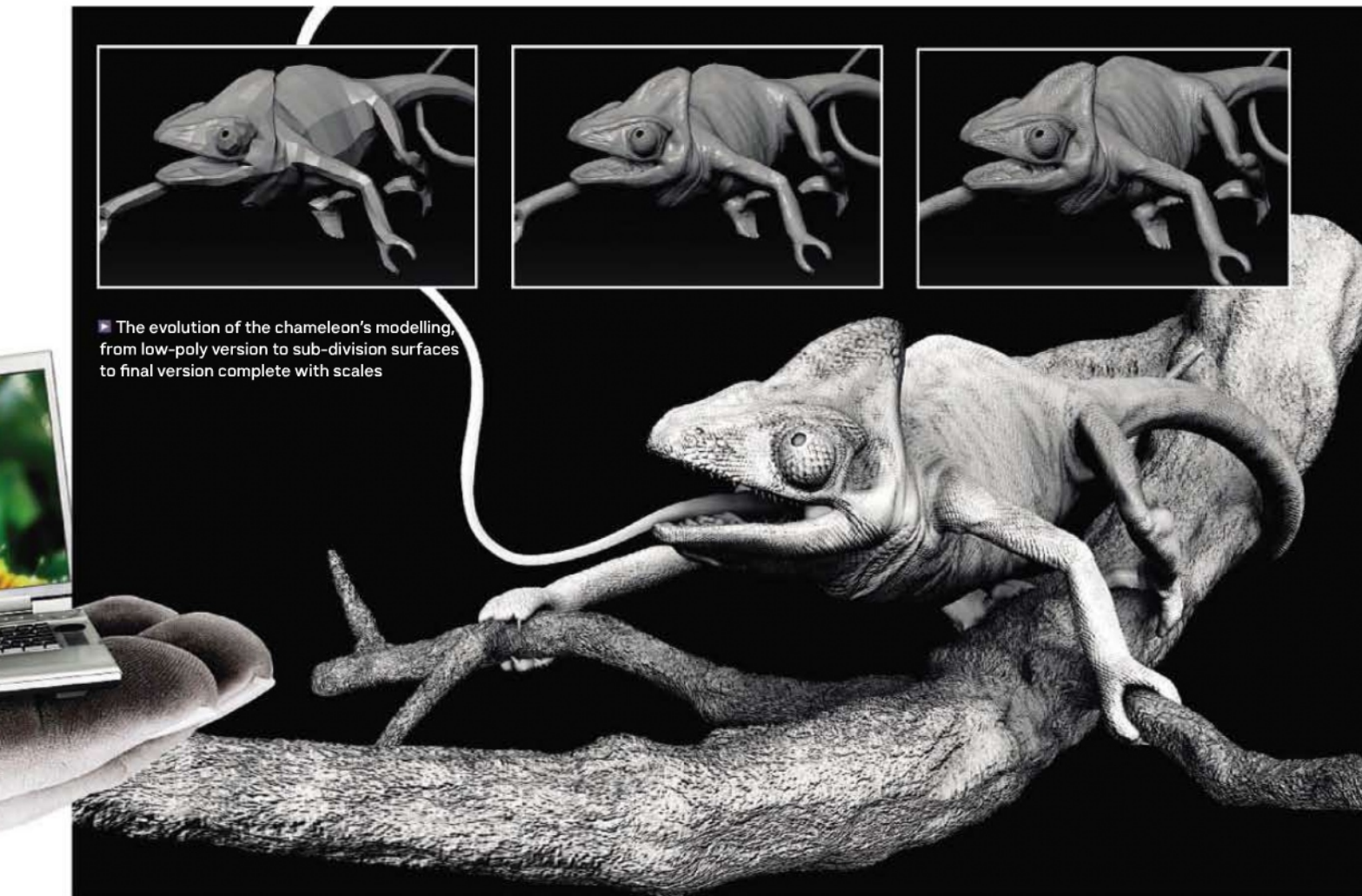
Having worked on the previous animation and print campaign for Citrix Systems we were delighted to work on the latest project with Young and Rubicam, San Francisco. Each concept has a great, unique challenge that we've enjoyed solving. The aptly titled Chameleon, promoting their computer virtualisation services, is a continuation of the brand's previous campaign launched worldwide in January of 2010. Citrix's ongoing campaign shows how their streamlined services enable you to store and share information wherever you are from one computer system.

For each of the animations, we integrated live action and CG, focusing on lively animation and photorealism. The main art

direction for the chameleon was for it to look real but also to capture the essential character of a chameleon, so we had an extensive research phase and created a range of concept sketches to get the look and feel.

The main shot is of the chameleon sitting in its own virtual environment within a computer screen, placed on a live-action shot of a hand, flicking his tongue out to seize other computer screens and bring them into the main scene. We opted out of a CG background in this instance and used live action footage as the back plate, to give the piece a really authentic foundation.

To achieve this, we filmed defocused trees moving naturally in the breeze. The scenes filmed were also photographed so that we



► The evolution of the chameleon's modelling, from low-poly version to sub-division surfaces to final version complete with scales

could use the same backplate for print, keeping the work consistent across print and motion media.

We created the lifelike creature itself using ZBrush 3.5, 3ds Max 2011, Character Animation Toolkit (CAT) and some dedicated rigging, all while taking advantage of our tried-and-tested 3D pipeline. Rendering was done with V-Ray 1.5 and we then composited the print in Digital Fusion. Towards the end of the process, our talented retouch team worked their magic to refine some of the raw 3D image in Photoshop by carefully balancing and refining tones, adding further texture and lighting effects.

look for our client. Work at these initial stages, and ensuring that we produced a variety of concept sketches, provided a great starting point. Nailing that and working on our first still image, which was used as our print-based set-up, was quite difficult; getting him to look really nice, as well as having his limbs in all of the screens and his head in the right position, was a challenge we had to grasp from the start, and the sketches acted as a helpful guide. From the sketches, we were then able to create the storyboards to establish timings of the chameleon movement, bringing all of the screens into the correct position in a slick animation.

robotic pace and the limb movements. Right from the start we built the chameleon with a realistic skeleton using the rigging tools within CAT to recreate all the correct motions. Really capturing the nuances of the creature is breathes life into any character animation; there was no motion capture so one of our artists lovingly hand-animated its every move.

The level of realism achieved on the chameleon is a reflection of what we do across all of our work: we're always striving to attain the highest quality render. Achieving »

“Getting the chameleon to look really nice, as well as having his limbs in all of the screens and his head in the right position, was a challenge we had to grasp.”

What we did right

1. We used concept images and storyboarded the chameleon

Before moving into production, it was important that we got approval from the client on the overall look of the chameleon, specifying colour, shape and size. Through extensive research we developed references and moodboards to hone in on the perfect

2. We used animation

The chameleon is a bit of an unorthodox animal to create, so it was important that we did sufficient research and emulated all of the subtle movements unique to its species. In our initial research, we looked at a lot of stock footage and nature programmes. A key feature was the eyes – each moving independently from the other – along with the



► 3ds Max's CAT (Character Animation Toolkit) was used to rig and subsequently animate the chameleon, without the help of motion capture



▲ Live-action footage of the hand was actually shot for a previous campaign for Citrix and simply re-used



this requires an organised and versatile workflow. We use a very efficient XREF system throughout 3ds Max which allows us to make amendments to multiple render pass files, while also rendering hundreds of millions of polygons at the drop of a hat.

Coupled with V-Ray to perform both the lighting and shading, it's a powerful and versatile system, giving our retouchers a highly detailed render from which to work.

3. We built the chameleon to be used across all media

This campaign, like the first we did for Citrix, was intended to span across print and digital from the very start. Building the CG using primarily ZBrush for both the modelling and texturing phases, we then jumped over to 3ds Max for the crucial rigging stage. This ensured that both its model and texture were of a high enough resolution that it could be printed at 8,000 pixels wide.

Traditionally, you would have an animation production company doing one part of the campaign, and a print production studio doing another. Most of the time they don't look the same and lack unity across the separate media, which means it costs the client and agency a lot more money as assets aren't being shared between print and motion. Instead, we were able to build one asset and animate it in 3ds Max's CAT, while also positioning it for print.

4. We re-used video footage

For the live-action hand that the chameleon is sitting on we re-used video footage from the very first shoot we did for Citrix. On that very first shoot, we gathered a lot of extra shots, making full use of our in-house studio, which meant we already had an extensive library of shots, saving the client money and time.

What we did wrong

1. We re-used video footage

Unusual, maybe, to feature the same point in both the positive and the negative section, but there were drawbacks to the footage re-use. The negative aspect is that it gave us some limitations in regard to lighting the monitors because we had to conform it to fit in with the existing lighting on the hand. We couldn't light it conversely or change it specifically for the chameleon or the screens placed in the shot. Luckily, this didn't have any impact on the project as a whole because our hero, the chameleon, lives within his own environment in the scene, so his lighting didn't have to correspond directly to that of the hand.

2. We wasted time creating a CG background

Initially, we had planned on using CG to create the out-of-focus background, but we soon decided that this wouldn't give us the desired results in the short time we had. So we picked up the camera and went out and photographed and filmed some outdoor foliage. This added an extra weight of realism, as you have photographic filmed movement which is reacting correctly with the lens.

The time we lost on this wasn't significant. With all of our services held in-house, we



SIMPLICITY IS POWER



■ The final animation combines the animated CG chameleon with a live-action backplate, the live-action hand and CG screens

have the flexibility to adapt to unforeseen situations, and we're always looking to find the most cost-effective and best-looking route for the client by being able to offer a variety of services spanning print and motion.

Lessons learned

As we increasingly work more with broadcast and live action, we began thinking about doing further tests with our chameleon. We love this little character and so we decided to move this project further into a full live-action shoot, keeping only the chameleon as a CG object. We're filming a live-action scene with the chameleon interacting seamlessly with the branch and his environment.

We're constantly trying to do the most creative work we can while evolving the way in which we approach it. We're in a privileged position of having all the services under one roof so we can always pull on another of our resources to solve a creative problem, and therefore push the boundaries of what the client is expecting. ■

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in VFX and
animation history
revisited on DVD

Hair raising

Tippett Studio tells Mark Ramshaw about the challenges involved in giving its wolf pack a more animalistic makeover for supernatural follow-up *The Twilight Saga: Eclipse*



VITAL STATISTICS

Title *The Twilight Saga: Eclipse*
Released
US: 4 December
UK: 6 December
Formats DVD and Blu-ray
Distributor
UK: E1 Entertainment
US: Summit
Entertainment
Watch for... The wolf pack joining forces with Edward and his friends to fight a vampire menace

Female Twi-hards famously divide neatly into two groups: Team Jacob and Team Edward. It's a very different story among the (somewhat smaller) male contingent following the supernatural saga, who root for Jacob and his Native American brethren every time. Little wonder: while Edward spends much of his time on screen moping, pouting or glinting prettily in the sunlight, Jacob's clan are prone to transforming into ferocious, oversized wolves at the merest whiff of trouble.

That scenes featuring the shapeshifters in the two most recent Twilight films pack such a punch is thanks to Tippett Studio, whose artists are now among the most experienced digital creature wranglers in the business. Hard to believe, then, that the studio only started carving this niche in 2000, with effects work for the movie *Cats & Dogs*. Even at that point, the hair simulation tools so crucial to the successful creation of photoreal were still at an embryonic stage of their creation.

"I remember we were working on *The Haunting* back in 1988, and we had a shot where Lili Taylor's hair needed to be moved by a ghostly hand, changing from a long style to a bun," says Eric Leven, visual effects supervisor on *The Twilight Saga: Eclipse*. "Our lead programmer at the time pretty much made it up as he went along. RenderMan had just come into its own with curve primitives and so we were really flying blind. It was only when we looked at what others were doing at SIGGRAPH the next year that we realised we weren't crazy after all!"

Thus the tool, initially jokingly named Rogaine and later Furrocious, continued to evolve, standing the studio in good stead for a succession of animal-themed visual effects jobs – up to and including the showstopping werewolf sequences for *The Twilight Saga: New Moon*. 2009 saw the introduction of a brand new in-house fur system, dubbed Furator. After making its debut, somewhat appropriately in *Cats & Dogs 2: The Revenge of Kitty Galore*, the tool was further put through its paces

in a good number of werewolf sequences for *The Twilight Saga: Eclipse*.

Improvements to the fur aside, the wolf models and rigs are actually identical to those used for *Twilight: New Moon*. That they appear larger, more dangerous and feral is actually all down to a change in the performance style.

Greater realism

"On *New Moon*, Chris Weitz's key mandate was that instead of yellow wolf eyes he wanted the actors' eyes in there, but he was pretty cool about letting us run with our own artistic style," says Leven. "For that movie we played on the idea that they are guardians, and so made them stand tall and majestic until they attacked. David Slade, on the other hand, wanted them to really act like animals. He even wanted to change the eyes back to yellow, until book author Stephanie Meyer pointed out that the vampires have yellow eyes. Now they keep their heads hung low, and tend to have a twitchier acting style."

Leven admits that this push for greater realism was a challenge on this movie. "It took a while for some of the artists to get their heads around it. But the nice thing was we had built hundreds of hours of reference footage for *New Moon*, as well as researching pack behaviours and visiting a wolf preserve. So we had a lot to work with."

Leven stresses that pretty much everything was animated by hand: "Some companies like to use mo-cap for animals, like Weta did with their horses for *The Lord of the Rings*, but we love getting in there and doing it ourselves.



KEY TECHNOLOGY

"Our original in-house hair system was built before we'd started using sub-div surfaces," says Tippet Studio's Eric Leven. "It also used a paint-based mapping system to define length, colour and so on. We often had 20 or 30 [areas], some with several channels, all of which had to be created by hand in Photoshop."

"The key difference with the new system is that we grow the hair using a node-based system, in much the same manner as using a compositing package. We can link up a length node to a randomisation or multiplication node, for example, and it becomes very trivial to make modifications. The other thing we did was to make use of GPU hardware rendering to enable the artists to preview and make changes without having to wait ages for renders."

"We were also running into problems with RAM and render times because every hair was an object in RenderMan. With the new system, we grow a certain number of hairs at fur generation time, pass that to RenderMan, and then have additional techniques to add a secondary groom without any footprint increase."

Images © Tippet Studio



■ An ambient occlusion pass for Jacob in wolf form. "There's not a lot of cheating with the fur rendering, though we do fake some ambient occlusion stuff, as we found it too time-consuming with millions of hairs," says Eric Leven. "Instead we'll do an average, or do ambient on the skin and then transfer that up the hairs. We're already figuring out new techniques for the next film, though."

■ Tippet Studio performed tests on the wolf pack's eyes, showing director David Slade both realistic yellow wolf eyes and, as in the previous movie, eyes based on those of the actors who play the characters in human form. Eventually Slade went for the latter option (pictured)



■ The studio's new fur system enables the artist to grow around 16 million hairs on each creature. "We can use the node system to say 'If the hair is getting dark, then multiply the amount of frizz', or 'If the hairs are shortening towards the nose, then increase the hair count'," says Eric Leven. "You can produce complex trees quickly"

And I'm not even sure how you'd go about motion-capturing a wolf..."

The rigs were built so that the artists manipulate the skeleton, which in turn drives the surface. The muscle system was added as an extra pass that reacts to and then slightly reshapes the skin. "While the muscle simulation does add something, a lot of the final subtlety is actually down to the secondary effects pass on the hair," says Leven. "There's a bit of thigh jiggle when they jump and land, for example, but there's hair



■ Director David Slade wanted the wolves in The Twilight Saga: Eclipse to behave much more like real creatures. Tippet obliged with leaner, meaner poses, twitchier movements, and lowered head stances, as shown in this piece of key art

"We love getting in there and doing the animation ourselves. I'm not even sure how you'd go about motion-capturing a wolf..."

Eric Leven, VFX supervisor

coverage up to 20cm long on the body, so generally it's more about fur bouncing up and down."

In addition to improvements in fur generation, Leven notes that the Tippet team was also able to achieve better integration into the environments for this instalment of the franchise, thanks to

a substantial revamp of the HDRI pipeline. "It's been a little ad hoc up until now, but now the system is much more mathematical, giving us a perfect match that allows us to get much further along with the lighting than before. There's still some artistic lighting to be done, but it's been invaluable – especially given that

the movie was shot with overcast skies and flat lighting."

While Tippet Studio's burgeoning reputation as a go-to studio for computer-generated creatures has enabled it to evolve impressive in-house tools and skills, Leven notes that – because of the relative paucity of franchises and sequels – opportunities to go back and revisit earlier work are actually quite scarce: "Generally we're faced with inventing new characters for each and every show, so working on The Twilight Saga: Eclipse was great in that we got a chance to go back and make something even better. And now we've been given the chance to do that again with the next film in the series, Breaking Dawn." ■

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■ Many remember Peter O'Toole's performance, but it was Freddie Young's Oscar-winning cinematography for 1962's *Lawrence of Arabia* that inspired the young Tim Alexander to seek a career in movies

My Inspiration
Leading artists
reflect on the
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New horizons

For ILM's Tim Alexander, *Lawrence of Arabia*'s endless desert landscapes were the start of a lifelong love affair with the visual possibilities of cinema

trip to London. I must have seen it 15, 20 times during that period. Even now, I probably see it once a year.

Everyone in the film is using one another to their own ends, and each time I saw it, I'd get deeper and deeper into the story, to the point that I started reading books about Lawrence himself. But what really blew me away was the film's cinematography.

Over the years, I've got more and more into cinematography. Some of the most amazing people in the industry are cinematographers. They tend to be quiet people, behind-the-scenes people, and I think they're unsung heroes. So much of the look and feel of a film comes from them. If I was ever to get out of visual effects, I'd love to be a cinematographer.

Around ten years ago, we did a lot of shoots on VistaVision, and when we came on set, everyone would moan, because the cameras were big, and noisy, and chewed up film quickly. It gave me a healthy respect for what they did on *Lawrence of Arabia* – being out in the desert, in that terrain, with those gigantic 70mm cameras.

You have to know what you're letting yourself in for before you watch the movie; it's long, and a little slow in parts. But if you do invest in it, there's so much there that you can't possibly catch it all in one viewing – and the way it looks is just stellar. ■

The first time I saw *Lawrence of Arabia* was in a movie theatre on Kapiolani Boulevard in Honolulu, Hawaii. I was still in high school, and I went to see it on my own because I didn't think my friends would be interested. I'd seen the movie on VHS at home – my father was really into films and on Sundays we'd all sit and watch a movie – but seeing it in 70mm was a completely different experience.

At the time, I didn't know much about film. But what drew me in was the way they shot the landscapes – those sunsets, the super-wide shots. When I think of the movie, I think of one particular moment: an extreme wide shot, with a blood-red sky above the desert, and a pile of rocks on the right-hand side.

After that, I followed the movie around: every time it was screening, I went to see it. I even saw it in a theatre on Piccadilly Circus during a



About the author

Tim Alexander joined Industrial Light & Magic in 1996, where he is currently VFX supervisor on Gore Verbinski's upcoming animated feature *Rango*. He won a BAFTA in 2000 for his effects work on Wolfgang Petersen's *The Perfect Storm*. ilm.com



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techniques tailor-made for Vue 8 Frontier from master Vue artist Dax Pandhi, starting on page 82. See below for important registration information.

Some scenes and other assets that appear in Vue 8 Frontier's dialog boxes are marked as requiring the Extras CD. Please note that this product is no longer available; but these scenes and assets are included in the Content Starter Pack, available for \$29 at cornucopia3d.com, as well as in Vue Esprit.

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Vue 8

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The viewport and toolbars

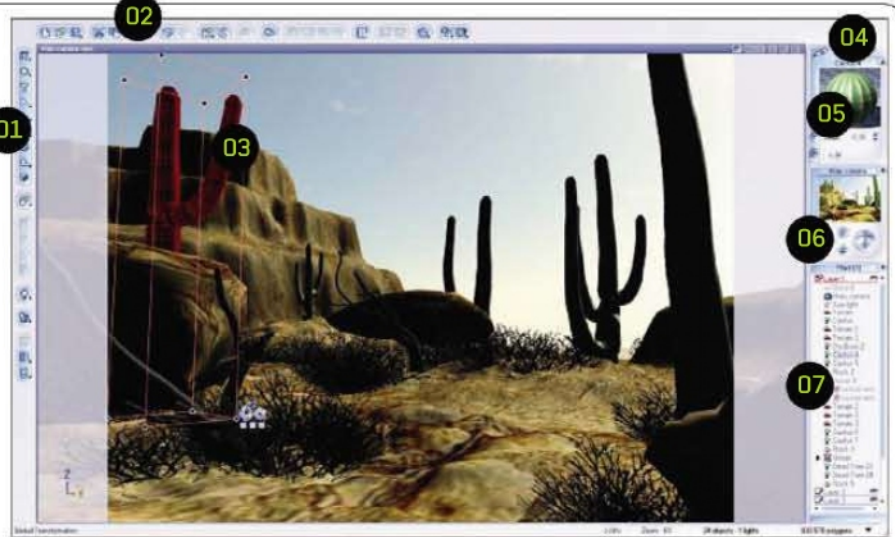
Load and edit objects, terrains and skies

01 Object Toolbar
Use this toolbar to create or load the various object types supported in Vue. You can add terrains, water planes, plants and rocks, for example, or even start with an entire planet.

02 Control Toolbar
Use this toolbar to perform basic tasks such as loading or creating new scenes, and copying and pasting objects within a scene. You can also open the Atmosphere Editor to edit skies and clouds, and adjust the viewport to show four camera views.

03 Object selection
Click any object in the scene to edit it. Use the boundary box to move or scale the object within the scene, or grab the rotation control in the bottom-right. Toggle the X, Y and Z axis buttons to restrict the object moving, scaling or rotating.

04 Object tabs
Tabs provide controls for the selected object. The Aspect tab provides material and preview options; the Numerics tab enables precise control over position and scale; and the Animation tab helps you establish parameters for animation.



05 Material Preview
See the selected object's current material. Right-click the sphere to access basic options such as loading or saving materials, or double-click to access the Material Editor.

06 Camera Preview
Choose your camera from any that are present in the scene, then adjust its position and orientation, either independently or in relation to the current selected object. You can also control the focal point. The mini-viewport

offers a render preview: right-click it to adjust the preview quality.

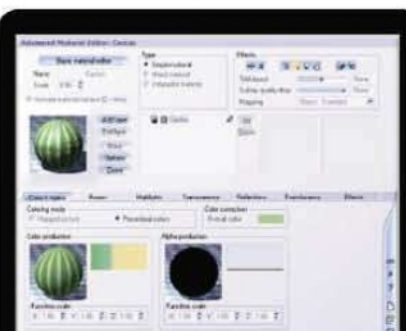
07 Objects and layers
See all current objects in the scene. Click any object to select it, then edit it using the tab controls. You can group objects so that you can move or scale them in unison. You can also arrange objects into layers, which you can show or hide to make managing complex scenes easier. Click any object icon to block it from appearing in the render.



The Atmosphere Editor

Create amazing skies

The Atmosphere Editor enables you to create realistic-looking skies – or to load one from the available presets. You can choose between four rendering models to control the quality, then use the tabs below to fine-tune every aspect of your sky's appearance, from the position of the sun to the degree of haze and fog. The Clouds tab enables you to add layers to realistic cloud cover to the scene.



The Material Editor

Create surface textures for any object

You can manage any surface texture in your scene using the Material Editor. Load a preset or create your own material, controlling its colour, bump and transparency values. Layers and mixed materials enable you to create sophisticated results.

For even more control, click the Advanced Material Editor button in the top-left of the dialog box. You now have access to tabs managing highlights, reflections and translucency, as well as effects that help you balance render quality and speed. And, of course, you can edit any preset you like, then save it as a new material to use in other scenes whenever you choose.

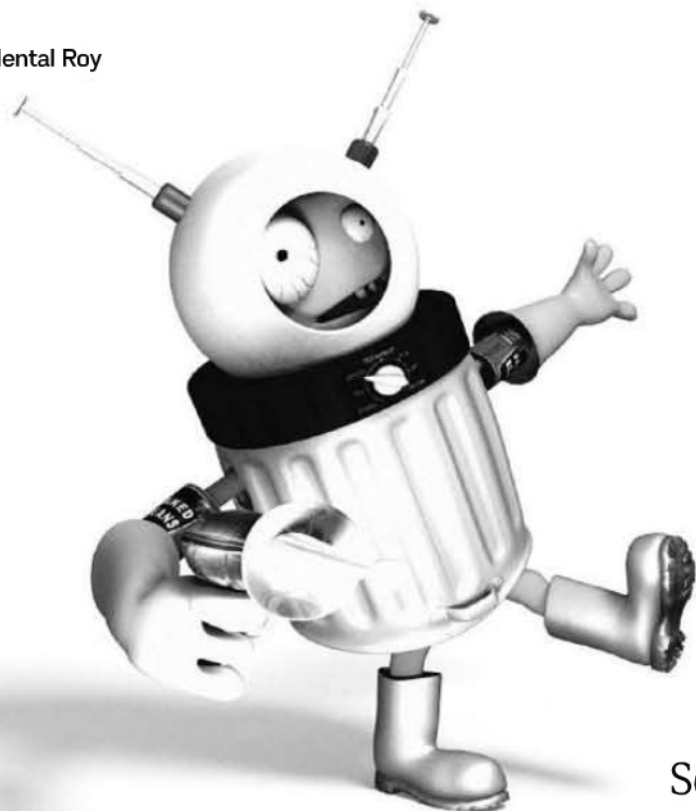


The Terrain Editor

Control the ground under characters' feet

Clicking the Terrain button in the Object Toolbar immediately creates a mountainous form; the Terrain Editor is where you can either fine-tune it or reshape it entirely. The left-hand toolbar offers a selection of terrain presets to choose from, including mountain ranges, single peaks, canyons, dunes and icebergs. You get a different result each time you click.

Now you can use terrain brushes to work over the detail of your shape, bringing up mountains, shaping valleys or adding ripples to sand dunes. The Effects tab provides one-click options for adding common land textures, from pebbles to craters.



Reality television

So, Mr TV Producer, you want movie-quality CG effects, eh? Best stump up the cash then, says Roy

Remember the good old days when cinema had one foot in the grave? And all because of some newfangled thing called television. Don't get me wrong. It's not that I've got anything against the movie industry. (At least nothing they've been able to prove in court.) But when TV sent moviemakers running to the Hollywood hills back in the 1950s, it did at least force them to stop churning out quite so much shameless garbage.

Funnily enough, shameless garbage is also what was showing on those television sets. But faced with a choice of a steady diet of free crap in the comfort of their own homes or paying to watch *Bedtime For Bonzo* at their local flea pit, it's little wonder Joe Public decided to give that Reagan fella and movies in general a wide berth.

"Now Doctor Who can't move for photoreal CG monsters and deep space battles. Even the bleedin' quarries are digital"

Of course, Hollywood finally pulled its finger out, bounced back, and eventually got the hang of big, dumb, effects-laden blockbusters. At which point us arty types, who would otherwise have ended up either homeless or – much worse – teaching at art school, realised we could find gainful employment in the dream factory instead. Quite literally everyone was happy. Until, of course, a shadowy coven of TV execs had the bright idea to improve the quality of TV programming – taking a leaf out of Hollywood's book by making programmes brighter, slicker, shinier, and even blessed with high-quality visual effects. Those *bastards*.

Just look what they've done to Doctor Who. Time was the good Doctor's alien foes were constructed in the manner of a Blue Peter craft project, relying on nothing more ambitious than a gimp mask, a splash of sparkly green body paint, and a length of hose piping attached to some poor actor's nipples. Every alien planet looked

suspiciously like a slate quarry near Macclesfield. Not any more; now the Doctor can't move for photoreal CG monsters and deep space battles. Even the bleedin' quarries are digital. A tatty show once cherished as a triumph of imagination over budget now has the look and feel of one of the recent *Star Wars* movies. (Only with real plots. And proper acting. And sometimes dialogue you're actually *supposed* to laugh at.)

But that's not the half of it. *Battlestar Galactica*, *Fringe*, *Smallville*, *Primeval*, *Stargate*, *Firefly*, *Heroes*, *Flashforward*, *Lost*, *Star Trek Voyager/Deep Space Nine/Enterprise*... the list of small screen shows with big screen ambitions goes on and on, and it's not just sci-fi. You can't survey a crime scene or solve a medical riddle without a hyper-kinetic CG walkthrough these days. It's like some kind of visual effects Tourette's.

If I'm honest, I really don't give a rat's arse whether these TV shows benefit from all the extra eye candy. If programme makers want to try to prove that you really can polish a turd then good luck to 'em. At least it means there's another revenue stream to help bankroll my lavish lifestyle. But can I really be the only one who has a problem with the notion of delivering movie-quality work for less money, with fewer resources and in a fraction of the time?

You want dinosaurs as good as those in a Spielberg movie? Fine. Give us \$60 million to play with. Need your new animated series to look like it just left the Pixar showroom? No problem, so long as we have enough animators to stage a coup in a small Latin American country. An *Avatar* gamechanger for the broadcast market? Of course, sir – just so long as you can wait four frigging years for it.

And if you think it's bad now, just wait until those TV execs jump on that stereoscopic 3D bandwagon and come knocking at our door, demanding two of everything. Then I predict the downtrodden CG artist masses will finally down tools, rise up and say "No more! This revolution will not be televised!"

Except me, that is. Frankly I'll be too busy putting on the gimp mask and vacuum cleaner attachments. I've heard there's a tidy sum to be made online in the fan film business. ■



About the author
Mental Roy has been lurking on the fringes of the 3D industry for years – usually fringes that contain pubs. We could tell you his real name, but then we'd have to kill you
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